No. 10.] [April, 1878.

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MIND

A QUARTERLY REVIEW

OF

PSYCHOLOGY AND PHILOSOPHY.

I.—NOTE-DEAFNESS.

For many years past, since the celebrated case of Dalton and the researches of George Wilson brought the subject into prominence, the common visual abnormality known as Colour-blindness or Dichroism has largely engaged the attention of physiologists and psychologists; and their observations have been of great value in suggesting new and luminous views with respect to the nature and mechanism of colour-perception. But there is a somewhat analogous auditory abnormality, which I believe to be at least equally common, yet of which I have nowhere seen any definite account. We often hear it said in conversation that such and such a person "does not know one note from another"; but most people seem to understand this statement merely as applying to a knowledge of the written musical symbols, not to the sounds which they represent. I have been led, however, to make inquiries into some such cases, and I find that the remark is literally true, in its widest acceptation, of many persons; in other words, that not a few men and women are incapable of distinguishing in consciousness between the sounds of any two tones lying within the compass of about half an octave (or even more) from one another. Upon this abnormality I have ventured to bestow the name of Note-Deafness; and I propose in the present paper to give a detailed account of one such instance, in a person whom I have had abundant opportunities of observing and experimenting upon. I need

hardly point out, at the present day, the value of such special observations. All psychologists are now agreed upon the necessity for a greatly extended study of individual peculiarities: and I shall be glad if the case which I am about to detail arouses other workers to similar examinations of very unmusical persons amongst their acquaintance.

My subject is a young man of thirty, sufficiently educated to comprehend and answer in psychological terms all inquiries made of him, and with a competent knowledge of the physiological mechanism of hearing. From his youth upward he had never taken any interest in music: but it was not till a couple of years ago that he began to suspect a physical malformation as the basis of his indifference. Since that time he has been subjected to a number of experiments, and with the following results.*

If any two adjacent notes upon a piano be struck, he is quite incapable of perceiving any difference between them. After careful and deliberate comparison, many times repeated, he believes the two sounds to be exactly alike. If the same notes be sung by the human voice, he is equally unable to discriminate between them. And if one of the notes (as for example, C) be struck, and the other (D) be sung, he does not perceive any greater incongruity than when the same note (C) is both struck and sung.

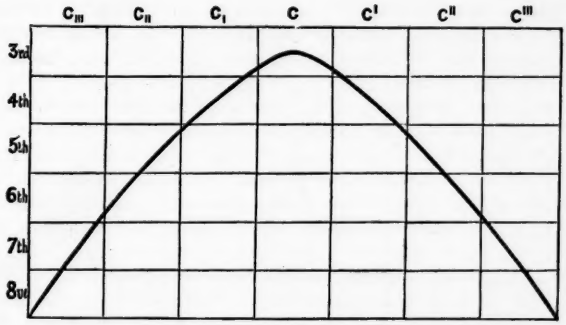
Further, if any note, say C, is played on the piano, and another note at a considerable interval, say E or A in the same octave, is subsequently played, he cannot notice any difference between them. As the interval enlarges to an octave or more, as from C to C′ or A′, he becomes gradually aware of a difference in pitch. And when notes separated from one another by very considerable intervals are struck, as for example C and C″ or A″, he is conscious of a very distinct unlikeness. In short, while he can perceive variations in *pitch*, when extremely great, he cannot perceive those minor variations which constitute what we call *notes*.

Between the highest and lowest tones on a piano, he notices a very great difference: and between the middle octave and either of the extremes, he can also observe a strong contrast. But when the notes are played in succession from one end of the key-board to the other, he can nowhere perceive any distinct line of demarcation between one tone and its neighbour. In-

* I have to thank my friend, Mr. G. J. Romanes, F.L.S., for kind assistance in performing most of the experiments hereafter detailed, and for affording me the use of the necessary apparatus. My acknowledgements are also due to Mr. F. Galton, F.R.S., who very kindly gave me the benefit of his advice, and helped me in the performance of one valuable experiment.

stead of the notes being separated sharply from one another in consciousness, like strips of coloured paper arranged in prismatic order, they merge indistinguishably into one another, like the colours of the prismatic spectrum itself. To him, three successive notes are not three clearly marked individual sounds, but rather resemble three pieces of blue ribbon, so nearly alike in shade that the eye cannot tell with certainty whether they are the same or not.

This incapacity for distinguishing between tones of slightly different pitch is not, however, the same in every octave. Experiment revealed the fact that in the middle octave of an ordinary piano, my subject was able dimly to discriminate between notes having the interval of a third from one another; that in the octaves immediately above and below the middle, the utmost power of discriminating sank to a third-and-a-half or a fourth; and that in the highest and lowest octaves it required a full seventh or more to impress his ear with a consciousness of distinct difference. The following diagram roughly represents these variations of discriminativeness—C standing for the middle octave; C′ C″ C‴ for the octaves above; and $C_{,}$ $C_{,,}$ $C_{,,,}$ for the octaves below, respectively.* It must be understood that, in each case, the line represents the *utmost limit* of conjectural discrimination.



* I have been strongly urged by a scientific authority of the greatest weight in these matters to construct a regular curve with a large number of ordinates, obtained by an application of Fechner's Calculus of Uncertainty to the present case. But, in spite of the great temptation to give an appearance of mathematical accuracy by such treatment, I have decided only to draw up a rude diagram of the sort here presented. In fact, the simulation of accuracy in such a case can only be delusive. My subject has to strain his attention painfully in order to perceive any difference whatsoever at the points indicated, and his answers, even so, are never very certain.

It should also be noticed that in attempting to distinguish between varying pitches he was greatly influenced by the *volume* of sound. Thus, on a piano, where the volume could be kept pretty constant, his discrimination was more uniform than with the human voice, where differences of intensity confused him sadly. Indeed, his judgment of pitch seemed in every case to be largely supplemented by other considerations. For instance, he could recognise the notes on a piano much better than on a violin, because in the latter instrument his attention was distracted from the pure musical effect by the scraping and twanging noises which necessarily accompany the tones. So, too, in the human voice, he was misled by those inarticulate and unmusical puffs or hisses which may be perceived along with every note. Evidently his ear is far more sensitive to these non-musical noises, relatively to pure tones, than is the case with normal persons. Thus, in the highest notes on a piano, he could hear a mere thud of the hammer, without any musical tone ; and if a very shrill whistle was held close to his ear, he could only notice a puff of air, which overbore in consciousness the weak musical tone ; while he could readily detect the latter when the whistle was removed to a short distance, so as to lessen the volume of the puff. This *compensatory* sensitiveness to indefinite noises seems to serve him in place of *timbre* as a means of recognising different voices or musical instruments. A piano is, for him, a musical tone, *plus* a thud and a sound of wire-works ; a fiddle is a musical tone, *plus* a scraping of resin and cat-gut ; while an organ is a musical tone, *plus* a puff of air and an indistinct noise of bellows.

It might be supposed that mere carelessness of observation led to this want of musical discrimination. Such, however, is not probably the case. As a boy, my subject was trained to sing with the remainder of his family, but never succeeded in learning anything in the way of music. At sixteen, being unaware of the radical nature of his deficiency, he took regular lessons for some time, but was given up as incorrigible. Later on in life, he put himself to the trouble of learning the notes on the piano mechanically, in order to understand the theory of sound, and experimented to some extent with acoustical instruments. It was a series of observations made on the siren and Savart's wheels that first suggested to him the extent of the difference between his own auditory capabilities and those of normal individuals.

If a large number of ordinates were employed, they would suggest an idea of absolute certainty at each stage, which could only mislead a reader who had not himself watched the experiments.

His attempts at singing, indeed, form some of the most instructive phenomena in the whole case. He will sing "God save the Queen" with scarcely a single note correct, and even the few which coincide with the true ones seem to have come right by accident. If a scale be sung to him, and he be asked to repeat the same sounds afterwards, he will utter the articulate words "*Do, re, mi,*" &c., but run up and down the scale in a disorderly manner, singing tones which do not stand in any musical relation whatsoever to one another.

Passing from the perception of separate tones to their effects in combination, experiments revealed the fact that a discord was no more unpleasant to him than a consonance. Though he was warned, so far as language would permit, of the sort of sound which he ought to expect in a discord, he could not perceive any of that roughness or harshness which was pointed out to him. Any two notes sounded together seemed equally agreeable to him, or, to speak more correctly, equally indifferent.

In order to test his power of discriminating between harmonies and discords, he was tried with a pair of movable organ-pipes, which could be made to produce beats of any desired frequency. It was found that when the beats were very conspicuous to an ordinary ear, he heard them readily and distinguished them as interruptions of the sound: but when they were more frequent, he did not find them disagreeable, though he still cognised them intellectually as a blurring of the sound, which he compared to the buzzing of a bee: and when they sank to a mere discord, he could not observe the roughness at all, nor indeed could he clearly distinguish very rapidly recurring beats while still moderately audible as such to normal ears.

The natural interval of an octave does not affect him at all differently from any other interval. He can perceive no greater resemblance or congruity between C and C′, than between C and D′ or C and E′. In short, the whole distinction of notes, based upon numerical ratios and their corresponding nerve-fibres, is completely lost upon him; and he can only apprehend that of pitch, based upon large absolute differences of frequency.

As regards the general capabilities of hearing, my subject does not seem to differ much from ordinary persons. Several tests, both of distance and lowness, were employed, and they resulted in a conviction that his power of distinguishing non-musical sounds is up to the average, and his hearing is unusually acute. Tried with one of Mr Galton's little instruments for testing the limits of auditory impressions, he was able to hear notes quite as shrill and quite as low as most other people. For the resonance of a vibrating string and the ticking of a watch, he was rather beyond the average in acuteness. But he is a bad mimic of

voices or dialects, and speaks French, to which he has been accustomed from childhood, with a decided English accent. However, as he is himself conscious of the two last-named facts, and can notice the badness of his own imitations, this defect lies more probably in the motor mechanism of speech than in the sensory mechanism of hearing.

With reference to the æsthetic results of these abnormalities, my subject is almost totally careless in the matter of music, for which he has no appreciation whatsoever. He recognises a considerable number of tunes when played or sung, but he seems to do so by the time alone. Whenever a piece specially strikes him, it is a lively air from an *opéra bouffe*, or the rollicking chorus to an old English song in which the time is strongly marked. He is equally pleased with the piece if it is played or sung out of tune, and enjoys it just as much when he sings it himself to notes of his own composition. He can distinctly appreciate, however, the beauty of a single note, struck in isolation, and perceives its æsthetic superiority to a mere noise. He likes the sound of a full and rich tone, produced by striking a finger-glass; and he is fond of church bells and chimes. He has also a delicate ear for metre in poetry, and is attracted by the music of Catullus, of Tennyson, and of Swinburne.

As to the hereditary aspect of the case, I have not been able personally to make observations upon other members of his family, but they have obligingly supplied me with the following particulars in answer to inquiries by letter. The father was quite unmusical, but not note-deaf, being able to distinguish between two adjacent notes on the piano, though incapable of observing any special relation between a tone and its octave.* The mother "is fond of music, vocal and instrumental, but does not sing or play except after a poor fashion". The remoter ancestors are described as being, on the whole, markedly unmusical. Of the children, a brother was at the same stage as the father, but exceeded him in the ability to tell when a singer was out of tune. The sisters are all more or less musical, and one of them possesses a fine voice. But it is worth notice that one of my subject's sisters had no aperture in the right ear, the auditory meatus being closed by a membrane; a fact which may possibly point to some hereditary defect in the structure of the organ. Unfortunately, no operation was ever performed upon her, so that it is impossible to say whether the internal ear was normal or otherwise. On the whole, the family is described as "in this respect only very moderately gifted".

*His own words are, "I cannot perceive any greater likeness between the two C's than between C and B".

I have been careful thus to place before the reader all the facts of the case, unencumbered by any hypothetical explanations, because whatever may be the value of my theory on the subject, the facts themselves must possess a great interest for all inquirers into the nature of our sensory system. But I shall now venture to offer a few suggestions as to the possible physical deficiences which underlie the above-noted psychical peculiarities.

Two principal explanations may be advanced. Either the deficiency may be in the peripheral organs or it may be in the nervous centres. We may examine each hypothesis separately.

If the deficiency is in the peripheral organs, we may plausibly account for it thus. While in the normal ear each one of Corti's organs may be supposed, on Helmholtz's theory, to be tuned in harmony with a very limited range of tones—or, in objective phraseology, to be capable of vibrating sympathetically with air-waves having very nearly its own natural rate of oscillation only,—we may suppose that in the case under consideration each one of Corti's organs is badly tuned, so that it can answer to a large number of tones—or, in objective phraseology, can vibrate sympathetically with air-waves possessing a considerable range of frequency. If this view be taken, we can understand why notes lying close to one another on the gamut do not arouse differential sensations, because they would both, in that case, stimulate the same fibres; and it would be necessary to take notes whose frequencies differ widely from one another in order to stimulate separate fibres each time, and so arouse a differential sensation. Again, on the same hypothesis, we can understand why the octave is not perceived by my subject as more congruous than any other interval; because the harmonics of each note would stimulate not only the fibre ordinarily assigned to them, but also adjacent fibres, and so a fifth or a seventh would be indistinguishable from an octave. Lastly, this view accords best with the fact that my subject does not notice any superiority in a consonance over a dissonance; because, if the system of damping in Corti's organs was deficient, we may suppose that the very faint interruptions which are the cause of discord would not have sufficient duration to allow of a cessation in the vibratory motions of the organs, and these would consequently yield a continuous state of consciousness, undisturbed by that roughness which results from intermittent stimulation. The point in frequency of beats at which they ceased to be distinguishable would be, in that case, the measure of the damping powers possessed by the organs.

If, on the other hand, we assume that the deficiency exists in the nervous centres, and suppose them to be so ill-differentiated

that they do not yield separate sensations for the stimulation of each separate fibre, we shall be enabled to explain all the phenomena except one, in a way that is perhaps simpler of comprehension. We may then imagine that each fibre is excited in the same manner as in normal cases, but that some ataxy of the centres prevents the stimulations from being differentially cognised. This explanation would accord well with the known phenomenon of *diplacusis*, where a single note is heard as of different pitch by the right and left ears respectively: in which case we can hardly avoid the supposition that corresponding fibres on each side are irregularly connected with non-corresponding central ganglia. But there will still remain the difficulty —why does not a dissonance produce its ordinary unpleasant effect? I do not see how we can escape this problem, except by supposing a peripheral malformation: and as, for this particular ear, we are compelled to assume it in the one case, perhaps it is simpler to assume it as the cause in all the others.

And now I should like to point out the special bearings of this abnormality upon æsthetic questions. In the first place, the instance I have given shows how largely our æsthetic feelings may depend upon peculiarities of sensation alone, uncomplicated by emotional or intellectual differences. My subject is often "much annoyed by the imputation of bad taste" which is cast upon him whenever he says that he "does not care for music". This imputation might fairly be made if he deliberately preferred bad music to good. But, as a matter of fact, the whole sensuous basis of music is utterly blank to him. He must not be expected to admire delicate shades of expression which he literally and really *cannot hear*. Again, what we call *bad taste* means in most cases the deliberate preference for combinations which arouse low, vulgar, or common-place emotions, over those which arouse high, sympathetic, or delicate emotions: but in my subject's case, most musical combinations can evidently rouse *no* emotions at all, and so he cannot fairly be credited with any kind of taste, good or bad. I believe inquiry would reveal the fact that many others are similarly situated, but do not really know the nature of their own deficiency. Such persons are very little likely to turn their attention to questions of sound; and it was the mere accident of the bent taken by his physical inquiries that led my subject to investigate his own case. There is therefore every reason why psychologists should hunt up these unmusical persons, and experiment upon them in the same manner as has been adopted in the present instance.

But while my subject is incapable of appreciating music, he can enter into all those æsthetic auditory feelings which are not based on the sensuous groundwork of harmony and discord. This

is the case both as regards the pleasure derived from simple tones, the pleasure derived from metrical arrangement, and (to some slight extent) the pleasure derived from the higher undifferentiated emotional element in music. There is even a certain "compensatory" heightening of his gratification in the second of these instances at least.

First, as to simple tones. If we accept the theory of Helmholtz, that noises are heard by means of the vestibule, while musical sounds are cognised through the instrumentality of the cochlea, it will follow that the nerves in the latter portion of the ear, being less frequently stimulated than those of the former part, will give rise to more pleasurable sensations. This effect we might naturally expect to remain, whatever might be the peculiarities of minor organisation within the cochlea itself. And the facts in the present case exactly coincide with this supposition. All musical tones are in themselves pleasing to my subject; and he is even able to discriminate between a rich and a poor note; presumably because the former calls into action an immense number of Corti's organs, while the latter, though it probably rouses sympathetic vibrations in a larger area of those organs than would be the case in a normal ear, yet affects a smaller total of fibres than a note with numerous harmonics.

Next, as to the perception of time and metre. One constantly hears it said by persons unaccustomed to psychological analysis—that is to say, by ninety-nine out of a hundred educated men—"What a curious thing that So-and-so, who writes verses, or who is so fond of poetry, should not care for music!" In reality, there is very little connection between the two sources of pleasure. The one is mainly sensuous in its ground-work, and depends upon the phenomena of harmony and discord; the other is mainly intellectual in its ground-work,* and depends partly on the fact of expectation, and partly on that of symmetrical recurrence. As my subject is unable to recognise tunes by the notes, and is consequently forced to recognise them by their time alone, his ear has been considerably trained in this direction. But the fact that the two are usually combined in music makes most people unable to distinguish analytically between them; and they consequently express great surprise when they find a capacity to appreciate the one, without the capacity to appreciate the other. Whereas, analogy would lead us to expect that a person whose attention was never distracted by tune would become unusually discriminative of delicate effects in metre. This I believe to be the case with my subject.

* I say "in its ground-work" in either case, because of course the higher effects of both are neither sensuous nor intellectual, but purely emotional.

Finally, as to the higher emotional element in music. Mr. Herbert Spencer has shown how the emotional expression of music is derived from the emotional expression of everyday life. But it is, so to speak, the ultimate outcome of that expression, pushed to the very highest pitch of delicate discrimination. Accordingly, we cannot expect that persons with less than average auditory endowments will be sensible to more than its broadest distinctions. And this is just the amount of appreciation exhibited by my subject. He can to some extent recognise the general tone of a piece—lively, gay, bright, subdued, tender, solemn, or majestic: but he cannot recognise those minor changes of feeling which are exhibited within the limits of a uniform composition. Of course his discrimination of the prevailing tone is largely due to time and degree of loudness; but it seems also to be influenced to some extent by the general pitch of the piece, and by the alternations of high and low notes. And it is noticeable that while he cares very little or not at all for purely musical pieces, where everything depends upon that delicate distribution of harmonies which is to him an absolute blank, he is slightly affected by bright popular tunes, in which the emotional element is pronounced, and in which rapid and striking variations keep alive the attention by the diversity of their arrangement. To put the matter simply, he understands in music only the part that is not strictly musical. And, as might be expected, he generally speaks in a rather monotonous voice, little modulated by emotional tones.

There are two other facts in connexion with this case worth notice for their wider psychological bearing. The first is this: my subject seems absolutely indifferent to the vast mass of musical sounds. If he is engaged in mental work, and a German brass-band or a barrel-organ is grinding discord under his very ears, he is quite unconscious of the fact until his attention is called to it. He suffers much from headache; but even in that morbid state of nerve, when noise is so intensely painful to most of us, he "would not perceive a drum-and-fife band just outside his window unless somebody happened to notice it in speaking to him". Music, in fact, under ordinary circumstances, quite escapes his observation. The second point is the converse aspect of the same peculiarity. Whenever circumstances compel his attendance at a concert, a choral service, or a musical party, where no other occupation is possible, he suffers from the most intense *ennui*, which "becomes after a time almost unsupportable". The music being an absolute matter of indifference to him, the effect is the same as if he "were made to sit quietly in an attitude of attention for two or three hours, while nothing whatsoever was taking place".

In conclusion, I should like to add that if any competent physicist or physiologist wishes to verify any of the above statements, or try any further experiments, I would endeavour to make arrangements with my subject for the purpose, on receiving a communication to that effect.

GRANT ALLEN.

II.—THE QUESTION OF VISUAL PERCEPTION IN GERMANY. (II.)

IN my first paper on this subject an attempt was made to give a rough sketch of the field of experimental research recently worked by the physiologists. The fruits of these labours have, as was there hinted, been turned to different accounts, since they have been taken up and embodied in quite dissimilar theories of the visual space-perception. In the present paper I purpose giving some account of these rival modes of interpretation, and indicating, as impartially as possible, what seems to be the relative value of these hypotheses.

It will be convenient to group these theories, after the example of Helmholtz, in two main divisions, the Innate or Intuitive and the Derivative theories; or, to adopt the German expressions the Nativistic and the Empiristic or Genetic theories. By the former are meant those modes of interpreting the phenomena which lay most emphasis on certain supposed instinctive dispositions and innate organic arrangements; by the latter those which accentuate the effects of experience, experience being of course conceived to be possible prior to the formation of the visual perception of space. The first class regard this perception more as something originally given, the latter conceive of it as a gradual process of growth or acquisition.

This division is necessarily a very rough one. The Nativists have always allowed that our visual knowledge of space owes something to experience, recollection, and inference. On the other hand the Empirist is now able, by means of the hypothesis of evolution and the law of heredity, to accept in a modified form some of the positions of the other side.

After reviewing the principal theories on the two sides, I will, in conclusion, touch on their relation to the space-problem as raised philosophically by Kant. With that problem the question between the Nativists and Empirists is, as we shall see, by no means identical.

I. *The Nativists.*

Beginning with the Nativists, we find a series of ingenious attempts to recast the innate hypothesis in accordance with the results of a progressive observation of the phenomena. We must content ourselves with considering some of the main developments of this theoretic movement.

The basis of the intuitive theory was laid by Johannes Müller,* who sought to bring the physiology of the senses into agreement with Kant's peculiar conception of space as a subjective mental form.† This he did in the case of visual perception by supposing that the retina has a direct knowledge of its own local arrangements. An impression on the retina—that is, a sensation of light—is regarded by Müller as a perception of the condition of a particular nervous fibre,‡ and the excitation of any retinal element necessarily involves the consciousness of its local peculiarities. And this perception of the local order of the various parts of the retina is all that is immediately seen in visual perception. "The retina," he says, "sees in every field of vision only itself in its spacial extension in the condition of excitation *(Affection)*." It is sensible of itself when most at rest and perfectly closed, as "spacially dark".

This primitive subjective intuition gives immediately the relations of space in two dimensions, including relative position, distance, and apparent magnitude. Only since the retinal picture inverts the real object, this subjective form does not accurately teach the property of direction (right, left, &c.). The reference of this intuitive form to external objects is regarded by Müller as an act of inference depending on recollected experience. Thus the erect position of objects, their distance, and so their real magnitude, have to be learnt. Single vision, or the combination of the impressions of the two retinas in a perception of one object in one and the same space-position, is thus accounted for by Müller. The corresponding or identical elements of the retinas have from the first the same space-consciousness. This arises from the fact that in the chiasma (the point of intersection of the optic nerves) each fibre coming from the brain splits up into two threads running to identical points. Hence the two impressions coalesce in a single perception. This

* *Zur vergleichenden Physiologie des Gesichtssinnes*, p. 56; *Handbuch der Physiologie*, II., pp. 262, 350, 361.

† This is asserted by thinkers as different as Helmholtz and Stumpf. On the other hand, W. Tobias thinks Kant stands to Müller in the relation of a midwife rather than of a father. (See *Grenzen der Philosophie*, pp. 106, 107.)

‡ This is pointed out by Ueberhorst, *Die Entstehung der Gesichtswahrnehmung*, p. 129.

is the first form of the Theory of Identity, a hypothesis which has vigorously maintained its place in German physiological speculation.

Müller's way of regarding the visual intuition of space as subjective or retinal has been adopted by only a small number of his followers. Some of the physiologists who immediately succeeded him endeavoured by means of it to explain certain of the more intricate facts of vision. Thus, for example, Recklinghausen ingeniously argued that the discrepancy between the apparent and the real right angle arises from the fact that the surface of the retina and the axis of vision meet obliquely, and as a consequence of this the optical images of the lines containing a right angle in the retinal image could form an oblique angle. A curious development of Müller's theory of retinal perception appears in the doctrine of Ueberweg* that the magnitude which we attribute to our retina, after the analogy of the image of the retina of other persons, does not constitute its true circumference; that this latter rather coincides with our whole field of vision; and that, conversely, the apparent magnitude of an external object is in reality only that of its actual retinal image.† A survival (in a modified form) of this subjective theory will be found in the doctrine of monocular space-perception held by Hering and Kundt, of which I shall speak presently.

It may be supposed that this notion of a subjective or retinal form of space which has to be referred to external objects by help of experience, would not permanently satisfy the nativists themselves. It would seem more natural and consistent to extend the innate capacity of the retina by attributing to it an original perception of the space external to itself; and this was done by means of the Theory of Projection ‡ which was maintained in Germany by Tourtual, as also by Volkmann in one of his earlier works. According to this hypothesis the retina has an innate capability of projecting its impressions outwards in the divisions of certain straight lines, as the axes of the impinging pencils of rays.§ This theory was clearly an extension of

* *Zeitschrift für rationelle Medicin*, Vol. V., pp. 268-282.

† This bold idea is criticised by Stumpf, *Ueber den psychologischen Ursprung der Raumvorstellung*, pp. 191, 192. Mr. Monck appears to put forward a doctrine of a perception of the retina not very different from that of Ueberweg, *Space and Vision*, p. 34 ff.

‡ This is Wundt's name for the theory (*Physiol. Psychologie*, p. 632). Helmholtz uses the expression to denote the empirical doctrine that impressions are referred to points of external space by help of certain mental processes, as distinguished from the hypothesis of identity (*Physiol. Optik*, p. 441).

§ Or the lines of vision (*Visirlinien*), *i.e.*, the normals passing through the centre of curvature which nearly coincide with these axes.

the idea that space is originally seen, since it makes instinctive the perception of direction and of the erect position of objects which Müller had regarded as acquired. According to this hypothesis objects are seen single, not because their images fall on identical points, but because the rays impinging on the two retinas meet in the object which emits or reflects them.

A closer study of the phenomena of binocular vision showed that both the Theory of Identity and that of Projection in their earlier form were beset with insuperable difficulties. It is obvious that the latter fails to account for the presence of double images. If the retinal images are through an innate tendency projected in the direction of the rays or lines of vision, we ought (as Wundt observes) to see everything single under all circumstances (since the rays always intersect in the luminous point). This difficulty was felt by Nagel, who endeavoured to modify the theory. According to him the two retinas are projected independently on different spherical surfaces, having the points of intersection of the lines of vision—approximately the centres of the eyeballs—as their centres. These surfaces intersect in the point of fixation; and in the case of vision with parallel axes, meet in a single plane.* While the Projection-theory accounts for the coalescence of the retinal images but not for the facts of double vision, the Theory of Identity, though explaining in the main the facts of double vision, fails to clear up the phenomena of single vision in the case of disparate (non-identical) points. Brücke† attempted to obviate this difficulty by saying that the coalescence of impressions in these cases may be effected by ocular movements which successively bring all points of the object on the identical centres of the yellow spots (points of fixation). This supposition was plainly disproved by the experiments of Dove with momentary electrical illumination.‡ (MIND No. IX., p. 22.)§

A further modification of the Theory of Identity had therefore to be made before it could be accepted as an adequate interpretation of the facts. This has been attempted by one or two recent writers with very considerable ingenuity, and a fine appreciation of the complexity of the phenomena needing explanation. I refer more particularly to the hypotheses put forth by Panum and E. Hering, who not only seek to bring the

* Nagel called this process of projection a "constructive" operation. He took a considerable step in the direction of the Empiristic hypothesis by affirming that this projection took place by help of the muscular feelings. See his work, *Das Sehen mit zwei Augen*, pp. 5, 99 ff.

† Müller's *Archiv*, 1841, p. 459.

‡ *Berichte der Berliner Akademie*, 1841, p. 252.

§ Further references to my previous article will be made under the form No. IX.

hypothesis of Identity into agreement with the results of recent research, but carry out the nativistic method yet more consistently by attributing to the retina an innate perception of distance, or the third dimension of space.

Panum* accepts so much of the hypothesis of Projection as to refer the perception of height and breadth (two dimensions of space) to an innate and specific mode of feeling the relation of the single retinal points to their lines of projection.† At the same time he accepts and modifies the hypothesis of Identity by saying that with every point of the one retina there is co-ordinated from the first, not simply an identical point, but a corresponding circle of sensation *(Empfindungskreis)*. When identical points are excited we *must* see single; with corresponding points (those contained in the corresponding circle) we *may* see single. What determines whether this coalescence shall take place in the case of corresponding points which are non-identical, is the presence in the circle of sensation of a contour resembling that of the given point *a* of the other retina. At the same time different feelings of depth or distance would arise according as the point *a* combined with this or that point of its circle of sensation. This perception of depth or solidity is called by Panum a sensation or synergy of "the binocular parallax".‡ By means of these innate capabilities of the retina Panum seeks to cover the intricate phenomena of the limits of single vision, and the perception of relief (No. IX., pp. 18-22). In addition to these innate capabilities or energies of the retina, he postulates "a binocular energy of colour combination," by help of which two colours seen binocularly are able to mix, and also "a binocular synergy of alternation," which is to account for the phenomenon of non-combination or rivalry of the two fields (No. IX., p. 23). In this way Panum endows the retina with quite a wealth of distinct innate powers. He may be taken as the most consistent and courageous representative of the nativistic hypothesis.

* *Physiologische Untersuchungen ueber das Sehen mit zwei Augen*, pp. 59, 82 ff.

† This is said to arise out of "a definite co-ordination and quality of the nerve-elements of the central region of the opticus".

‡ By the expression "binocular parallax" is meant the circumstance that an object point lying behind or before the point of fixation will project its image on points of the two retinas unequally distant from the centres. The effect of this may be either a perception of double images, or one of relief or solidity. The stereoscopic arrangement imitates this, by causing the image of a nearer or more distant point of the scene to fall on the two retinas at unequal distances from their centres instead of on corresponding regions.

The peculiar theory by which E. Hering* attempts to interpret the facts of visual perception may be looked on as the most able and convincing presentation of the nativistic point of view. It allows more to the empirists than Panum's hypothesis, and by carefully marking off the region of innate perception and empirical acquisition, seems at first sight well fitted to resolve the difficult questions here at issue.

Hering's theory sets out with the conception of an original and purely sensuous form of space, which has to be filled in and completed by elements of experience. This space is not subjective in the sense of Müller's doctrine that the retina has an original knowledge of its own local arrangements and spacial dimensions. It is from the first intuited as a form or mould into which objects may be projected. It is true that, when dealing with the construction of the monocular field, Hering argues as though the retina had a direct consciousness of its own spaciality; yet, as Helmholtz points out *(Physiol. Optik,* p. 594) this idea appears to stand in direct contradiction to his main theory as expounded in connexion with binocular vision.†

According to this main theory, the original sensorium has consciousness, but not self-consciousness. It *feels (empfindet)* light and space, but does not place itself over against that which is felt as an ego. Hence it does not see things in this or that (absolute) direction, since direction pre-supposes a reference of all space-relations to an ego as a centre. We can only speak of the spacial relations which objects have among themselves in this original subjective visual space. As, however, there must be some starting-point to which all spacial relations have to be referred, we may most conveniently select the main point *(Kernpunkt)* of the field of vision, that is, the point which answers to the centre of the yellow spot of both retinas. This point has no definite place, and can, like every other point of the field,

* *Beiträge zur Physiologie.* The theory is summed up in section 124. Some of its positions are adopted by Mr. T. K. Abbott in his *Sight and Touch.*

† Hering introduces this idea of the retina's knowledge of its own spacial relations in order to explain the illusions of the single eye in the estimation of linear magnitude, &c. (See No. IX., p. 9.) He supposes that the eye measures the distance of two retinal points, not according to the length of the retinal arc, but according to that of the chord. This becomes shorter —in relation to the arc—as the distance of the two points increases. Hence the excessive estimation of a divided, as contrasted with an undivided, line, of acute as contrasted with obtuse angles, and so on. This theory, which is also maintained by Kundt, is well criticised by Helmholtz, *Physiol. Optik,* pp. 571-2, and by Wundt, *Physiol. Psychologie,* p. 569.

only be spacially determined in relation to other points simultaneously felt.*

The images of the various retinal points group themselves about this main point by help of certain "space-feelings". Every retinal point has first of all a peculiar value of height and breadth (two dimensions) which increases with the distance of the point from the centre of the yellow spot, and which is of an opposite nature in the case of points above and below, to the right and the left of this point. These feelings of height and breadth constitute "the feeling of direction" for the place in the common field. Identical points have the same values. In this way the retina is able to order its impressions in two directions.

In addition to these two "space-feelings" there is a third—namely, the feeling of depth. This feeling is of equal but opposite value in the case of identical points, so that their combined value is zero. Symmetrically lying points of the two retinas are in all respects equivalent. The value of the inner retinal semicircles is positive—that is, answers to greater depth or distance; that of the outer semicircles is negative, answering to greater proximity.† Identical points, having the depth-value zero, appear through an immediate act of sensation in a plane called the main surface in the field of vision.‡

This surface has at first no definite distance. There is in this primitive vision of space no reference to far and near. This arises only after the mental image *(Vorstellungsbild)* of our own body is on every occasion "built" into the visual space. This same recognition of the body as a starting-point in visual space is the basis of the sense of direction (absolute direction) which, as Hering himself has shown (No. IX., p. 13), is estimated as diverging or radiating from a point lying midway between the centres of the two eyes.§

At the same time Hering allows much to the influence of

* Hering distinctly says that in this subjective space we have nothing to do with "absolute determinations answering to real space," but only with "relations of single points among themselves".

† The meaning of this will be seen by a reference to the fact that if a given point *a* is fixated, a point *b*, lying behind *a*, will project its images on the two inner halves of the retina, while another point *c*, lying in front of *a*, will be imaged on the two outer halves.

‡ The only points which have the same values of height, breadth, and depth, are those lying in the middle longitudinal (vertical) section of the retinas.

§ Before this representation is added, the eyes see in parallel directions. The representative image of the body is of course itself visual. Hering thinks it is only a want of imaginative power which prevents us from adding a complete intuition of our body to the visual field as we do in dreaming.

later acquisition in rendering precise the perception of distance.* So, too, he recognises the effects of experience in the combination of the images of disparate retinal points in single perceptions. Herein he differs from Panum. He seems to hold, however, that with growing practice in attention double images might be distinguished where they now appear to the ordinary observer as inseparable.

Only one other theory on the nativistic or intuitive side needs to be dwelt on here. This is the doctrine of visual space recently unfolded by Stumpf in his able and interesting volume, *Ueber den psychologischen Ursprung der Raumvorstellung.* Stumpf's work is largely critical and polemical, and his own theory is given rather as a supplement to his systematic discussion of the various rival hypotheses. Moreover the author is not, like the writers just enumerated, so immediately concerned with an interpretation of facts reached in a special department of scientific research, but rather aims at giving greater philosophic precision to the problem of our space-knowledge. Nevertheless, since it is so closely related in its main features to some of the preceding nativistic theories, it will be well to include it in our present review.

Stumpf holds firmly to the notion of an original sensuous space. He is, further, very clear as to the non-existence of any original knowledge of retinal space. Extension and quality (light, colour) are "psychological parts"—that is to say, inseparable—and so "partial contents," and are to be contrasted with "independent contents," which may be separated. The presentation of space in two dimensions (*Flächenvorstellung*) is original or intuitive, though it depends on certain physical causes or stimuli. Thus, instead of Lotze's acquired mental local signs (*vide infra*) he would postulate certain physical local signs—namely, the local separation and order of the nerve-fibres themselves.

Depth or distance (third dimension) is directly felt in sensuous intuition like the other two dimensions.† It is originally felt by the single eye, and not first by the two eyes. Like the other dimensions too, it has its physical causes or stimuli. Respecting these stimuli, Stumpf expresses himself with considerable diffidence. He seems disposed to allow most weight to the circumstance of accommodation, which may, by altering the

* Nevertheless he altogether rejects the idea that this is assisted by any kind of motor feelings, the existence of which he denies.

† Stumpf has an elaborate argument in favour of the proposition that distance is originally given in visual sensation. One of the reasons urged is that the perception of a surface, since it involves two sides, must also involve depth of distance.

degree of tension of the retina, modify in some way the optical nervous process. According to this view we see originally a distance which varies with the degree of accommodation. Yet Stumpf does not finally decide between this hypothesis and that of an original intuition of some single distance (adopted by Hering). For the rest, he allows a large part in the development of our mature perception of distance to those elements of association (distinctness of image, feeling of convergence, &c.), on which the Empirists are wont to insist (see p. 217 ff.).

Among the circumstances which thus determine or render precise the perception of distance is that of binocular parallax. This physical element affects consciousness by partially or completely separating the retinal images of a point lying before or behind the point of fixation. The conscious feeling thus arising (either a sense of confusion in the image or a perception of distinct images) is associated with the idea of a definite distance through the representation of a certain alteration in the mode of fixation.

But now comes a difficulty. If we first present to the eyes a concave surface, and then its obverse convex side, or if we exchange the two stereoscopic pictures of a concave surface, the retinal images of the points about the centre (fixation-point) will fall in the second case on regions of the two retinas exactly corresponding to the regions affected in the first instance.* Yet we are at once able to say, even with a momentary electric illumination, whether the points are nearer or further than the centre of the object fixated. Why should these two composite impressions be distinguished at all, seeing that pairs of corresponding points are affected in the two cases? Further, how is it we know that this difference is one of before and behind the fixation-point? Stumpf answers the first of these questions in the same way as Helmholtz by saying that the impression of the one retina is or may be consciously distinguished from that of the other. The second question he answers by help of the following hypothesis, which is essentially the Projection-hypothesis as modified by Nagel:—Each retina from the first projects its images by an immediate act of sensation on a spheroidal surface (concave) lying at a certain distance.† The two surfaces intersect in the point of fixation. As a consequence of this we are able to give a different place (namely, one before and behind the fixation-

* That is to say, a point p will in the second case image itself on a point of the left retina exactly corresponding to (that is, equi-distant from its retinal centre with) the point of the right retina which received the image of p in the first case. Similarly with respect to the point of the right retina excited in the second instance.

† One must suppose this to be given by the degree of accommodation (see before).

point) to the double images arising in the two cases just described. What the difference of distances between the two points thus distinguished actually amounts to must, of course, be learnt by means of the associations already referred to.

With respect to the much-vexed question of single and double vision, Stumpf follows closely in the wake of Hering and the other advocates of the Theory of Identity. Like Hering, he appears to think that the power of recognising double images may be indefinitely increased by exercise. He allows, further, a considerable part to the imagination, as guided by past experience, in the fusion of the impressions of disparate (non-corresponding) points. Stumpf thinks there must be a physical cause for this identity of localisation, and he is inclined to content himself with the bare fact of the local similarity of the corresponding fibres, leaving undetermined the question whether they preserve their symmetrical position throughout their course, or even become united in single fibres (as Müller assumed).

Fully to criticise the theories here roughly outlined would require too much time. It may be well, however, to mention two or three principal objections to which the nativistic hypothesis, in the several forms in which it has so far presented itself, appears to be specially exposed.

(a) First of all, then, it has not, in the judgment of such trained observers as Helmholtz, Wundt, and others, fulfilled the first conditions of a scientific hypothesis, by reconciling itself with all the ascertained facts.* Thus, for example, Helmholtz brings forward as an objection to Hering's doctrine—that we measure linear magnitude by the chord which unites the two extreme retinal points affected—the fact that the illusions to be explained by this curious hypothesis occur just as certainly when the difference between the length of the chord and of the arc is no longer distinguishable *(Physiol. Optik*, p. 572). Again, the theory of Identity cannot be said to have adapted itself to the fact emphasised by Helmholtz, that not only the images of disparate points sometimes coalesce, but those of corresponding points are sometimes seen double. The circumstances called in to explain these discrepancies (want of attention, inaccurate fixation, &c.), do not, in the light of the collective evidence, appear

* It must be allowed, however, that the testimony of different observers respecting facts is far from being as uniform as one could wish. To give a single instance: Helmholtz asserts that vertical magnitudes—*e.g.*, the height of a mountain—appear greater when seen indirectly on the confines of the field than when viewed directly. Classen in his last work (*vide infra*) denies this, and maintains exactly the reverse. Objects are said to look smaller, and especially shorter, in indirect than in direct vision.

to be at all as influential as they are here represented. Once more, Helmholtz and Wundt urge against Hering's hypothesis of feelings of depth, that according to this theory the double images of a side-point at a distance from the observer unequal to that of the point of fixation ought to appear at different distances, whereas Hering himself admits that this is not so as a rule.*

(b) In the second place, it may be objected to this hypothesis that it is beset with certain inherent difficulties. Thus, in each of the forms it assumes above, it postulates the existence of an innate intuition which is in its nature very hard to conceive. How, for example (to take Müller's form first), is the mind to intuite the spacial relations of the retina, except it has at the same time some vague knowledge of the space beyond? or how are we to conceive Hering's *Kernfläche* lying at a wholly indefinite distance? The difficulty in the case of Hering's doctrine is even greater probably than in that of Müller's hypothesis. In truth, Hering's hypothesis appears to involve the fallacious assumption that there can be an idea of distance in general apart from particular distances.†

(*c*) Again it may be asked how we are to conceive the relation of this primitive perception or "sensation" of space to the later and acquired perception which is incorporated into it. It appears to me that in this respect, too, the later developments of the Nativistic hypothesis have rather increased than diminished the difficulty. If the mind has originally a knowledge of a circumscribed section of space (retinal space), we may perhaps understand how it learns to extend this presentation, just as a child can easily go on to understand months and years if it starts with a clear idea of days. But how are we to conceive the indefinite space-feelings of Hering expanded into the clear and determinate perceptions of the mature organ? or how imagine Stumpf's perceptions of the spheroidal surfaces taken up, so to speak, into our ordinary intuitions of distance? There must surely be something in common between the original and the acquired factors in this composite perception of distance. But if so, is it not a little improbable that the original element is wholly distinct and *sui generis?*

Just as it is difficult to conceive the acquired element com-

* Helmholtz argues, too, against Nagel's hypothesis of Projection that there is in reality no such distinct perception of the different distance of the two double images as this theory requires. The same objection would appear to apply to Stumpf's modification of this hypothesis. (Wundt just refers to this last as identical with Nagel's.)

† Stumpf of course escapes this difficulty by assuming that one particular distance is felt in every case, answering to the state of accommodation.

bining with and giving substance, so to speak, to the original sensuous element where the two do not interfere with one another, so it is difficult to understand how so much of the primordial intuition becomes overpowered by the added factors when these admittedly clash with the former. Helmholtz lays great emphasis on the fact that according to the concessions of the Nativists the original intuition is constantly overpowered by elements of association.* He disputes the assertion that sensations can ever be thus displaced by associated representations.† At least we may, as he remarks, naturally expect that the original intuition (*e.g.*, that of double images) should persist, even as an illusion.

(*d*) Lastly, supposing that this difficulty of co-ordinating the original intuition and the subsequent acquisition could be surmounted, it would still be an objection to this theory that the primordial visual intuition here assumed is a pure supposition, of the real existence of which we have not the least evidence, when we might reasonably look for such, and which is constructed solely for the purpose of accounting for the facts. This objection applies to Hering's notion of a *Kernfläche*, and to Stumpf's hypothesis of spheroidal surfaces, as well as to Müller's doctrine of an original perception of the retina itself,‡ and to the curious array of innate cognitions attributed to the retina by Panum. All such hypotheses are in their nature too fanciful to supply an adequate scientific solution of the problem. At least we have no business to resort to them until we are certain that known facts and laws are unequal to the task of solving this problem. This is the position taken up by the Empirists, and we have now to inquire how far they have succeeded in accounting for the phenomena by help of known physiological and psychological processes.

II. *The Empirists.*

The common basis of principle adopted by the Empiristic or Genetic method may be briefly summed up as follows:—Space is not, as the Nativists say, originally seen (like colour). It is a mental growth or acquisition, depending on a number of elemen-

* See his able criticism of the Nativistic Hypothesis (*Physiol. Optik*, pp. 441, 442; *cf.* Wundt, *Physiol. Psychologie*, pp. 636, 637).

† I do not here examine the worth of this statement. It has been ably criticised by Stumpf. (See my *Sensation and Intuition*, p. 67.)

‡ The idea of an instinctive projection of the retinal images in the direction of the rays or lines of vision appears to me to be simply an extension of Müller's theory that the mind (apart from objective observation of other eyes) knows immediately what takes place within and without the organ in the process of visual stimulation.

tary experiences. Among these the feelings which accompany the action of the ocular muscles play the most important part. The locality given to the impressions of the various retinal fibres is not original, but is built out of motor experiences. The impressions of the two retinas are not inseparably connected by any innate anatomical arrangements, but are originally distinct, and combine only under the influence of experience. The visual perception of spacial relations, though mediated by certain ocular feelings, includes associations with extra-optical facts. This is especially apparent in the case of direction in relation to our body and of distance.

While there is this general agreement in the method pursued, there are not wanting numerous points of difference. These will emerge in the consideration of the particular systems. Some are comparatively unimportant, as the exact nature of the muscular feelings, or the extent to which actual movement enters into visual estimation (No. IX., pp. 7-9). Others again are more important, as, for example, the question how the retinal elements reach their developed local sensibility, and what may be the nature of the mental process by which our space perceptions are formed. A still more vital point is, how far the visual perception of space is assisted by certain innate dispositions.

The empiristic line of investigation can be traced back beyond Johannes Müller. As early as the year 1811, Helmholtz tells us, an attempt was made by Steinbuch (*Beiträge zur Physiologie der Sinne*) to deduce the phenomena of space from the movements of the eyes and the body. The resumption of this mode of inquiry after the influence of the Kantian philosophy on physiology was itself due to a new philosophic influence. It was Herbart's peculiar theory of space which gave the impulse to recent empirical investigation. According to this theory, which sets out with the unity of the mind, all presentations (*Vorstellungen*) are successive, and only become ordered in the form of space when they constitute a reversible series. Herbart at the same time regarded movement as an essential factor in the development of the space-intuition. Hence under his influence physiologists were led to set out with the idea of an original qualitative difference of sensations only, and to construct the perception of space out of motor experiences.

The empiristic or genetic direction in the domain of physiological optics has been followed more or less fully by a considerable number of writers, including among others Volkmann, Meyer, Lotze, Cornelius, Nagel, Classen, Wundt, and Helmholtz.*

* Not that these are all to an equal extent empiristic. The presence of nativistic elements has already been shown in the case of Volkmann and

I do not intend to give an account of the particular form of the Empiristic doctrine propounded by each of these writers. It may suffice to select three who have done most to develop the empirical view, and whose speculations have had the greatest influence. I refer to Lotze, Helmholtz, and Wundt.

Lotze * set himself more especially to discuss the problem how we come to order the sensations of colour in the superficial field of vision. This problem is that of Herbart, and was discussed by Waitz and Cornelius before Lotze.† By these the question was answered with the help of Herbart's doctrine of the unity of the mind. This metaphysical basis is dispensed with by Lotze. He departs from the Herbartian stand-point still further in that he rejects the theory that a perception of spacial relations (the coexistent) can arise out of a reproduction of serial or successive feelings.‡ Lotze does not attempt to explain how it is that the mind is compelled to construct its intuition of space. He only seeks to indicate the means by which this is effected. These he finds in certain feelings connected with the muscles. In thus deriving the local discrimination of the retina from motor experiences, Lotze clearly places himself at the genetic or derivative point of view, even though he will not allow that our perception of space is a pure product of such simple experiences.§

Lotze thus explains the process by which the eye learns to

Nagel. Classen has done much to work out the derivative view; nevertheless, in a recent work (*Physiologie des Gesichtssinnes zum ersten Mal begründet auf Kant's Theorie der Erfahrung*, 1876) he attaches himself to the Kantians. Wundt speaks of Volkmann and Classen as occupying a middle position between Nativism and Empirism.

* Lotze's theory of tactual and visual localisation is found in its earlier form in his article, 'Seele und Seelenleben,' in R. Wagner's *Handwörterbuch der Physiologie*, and in his *Medicinische Psychologie*, Book II. p. 328 *seq.* More recent utterances are to be found in a communication printed as an appendix in Stumpf's volume, and in an article headed 'De la formation de la notion d'Espace' in the *Revue Philosophique* (October, 1877).

† Lotze's historical position is clearly indicated by Ueberhorst, *Die Entstehung der Gesichtswahrnehmung*, p. 161 ff. His doctrine is sharply distinguished from that of Herbart and of Waitz by Wundt. (*Op. cit.*, pp. 493, 494.)

‡ His chief argument is that were it so, we should give a space-order to our sensations of tone (in singing the scale). The same argument is developed by Stumpf as an objection, not only to Herbart's theory, but also to that of Professor Bain. (*Op. cit.*, pp. 33 and 55.) It is also adopted by Wundt. (*Op. cit.*, p. 494.)

§ Lotze tells us these local feelings are not the causes, but only the occasions of the mind's construction of space, which involves in addition to these the mind's own activity. Stumpf speaks of Lotze's local signs as 'psychic stimuli.' The notion that the mind exerts a unique activity in the formation of the space-intuition out of motor feelings is adopted by Ueberhorst who postulates the existence of a 'locating activity' (*ortsetzende Thätigkeit*).

localise its impressions: "Every stimulus *a* effects first of all a sensation *a* which changes into another *β*, when the quality of the *a* passes into another *b*; but besides this, every stimulus excites a second sensation *ν*, which is dependent on the point excited N, and which changes into *π* if *N* passes into P, or more correctly, if the stimulus wanders from the point N to the other point P. Accordingly, every impression which is to undergo a localisation, is to be regarded as an association of two impressions, which disturb one another just as little as two associated representations mutually modify their content".

The question now arises wherein consists this added sensation *ν*, which is called by Lotze the 'local sign' of a sensation. This is not derived from the nature of the particular retinal point N excited, but from its connexion with the system of ocular muscles, and the reflex movements which are thus produced. The excitation of a given retinal point is organically connected with that particular combination of muscular actions necessary for bringing this same stimulus on the centre of the yellow spot.

The further question arises whether these local signs are physical or mental? Lotze had first of all (*Med. Psychol.*, p. 350) described them as 'impulses' (or 'tendencies') to an actual movement of the eye. This expression was criticised by Stumpf; and in his latest utterance Lotze distinctly calls them 'feelings of movement'. In the eye of the new-born child the stimulation of a particular point in the outlying region of the retina is followed by the actual execution of the appropriate movement. This movement produces a definite feeling of movement, which cannot be further defined except by saying that it is a mode in which we are affected ("eine Art wie uns zu Muth ist"), and which differs from other modes when other movements are carried out.* In later life, when two or more points are simultaneously stimulated with equal strength and consequently no movement follows, the feelings of movement previously experienced cling to the impressions. In this way the eye learns when in a state of repose to localise the various impressions which fall on the retina.

These local signs compose a graduated system corresponding to their respective movements. If we think of the retina as a circle, then for all points which lie on the same radius the quantity of movement towards the centre will be different; for all points equidistant from this centre, but lying on different radii, the direction of movement will vary; for points on different

* Lotze supposes that the action of a given muscle (or set of muscles) is somehow distinguished from that of others, though he objects to the idea that an adequate cause of this difference in feeling is the local separation of the muscles and motor nerves.

radii and at different distances from the centre, both the quantity and the direction of the movement will vary. The feelings of movement vary in quantity and quality according to the magnitude and direction of the movements, and consequently exactly correspond to these last in the case of the various retinal points.

While Lotze has thus made use of the feelings of movement to account for the monocular construction of space in two dimensions, Helmholtz,* gathering up the results of many previous workers, has sought to apply a similar method of resolution to all departments of vision. More than this, Helmholtz is not, like Lotze, hampered with any metaphysical presuppositions respecting the nature of the soul. He follows the empirical psychology of J. S. Mill rather than the metaphysical psychology of Herbart.

Helmholtz sets out with the proposition that our sensations are for our consciousness signs, the meaning of which is left to be learnt by our understanding. Thus through experience we learn what impression an object which we see would make on our eye or other organ of sense, if we were to move the eye or body. The sum of all these possible sensations is our presentation (or representation) of the body. The only psychical activity required is that known as the reproduction of associated ideas. This conception accounts equally well for the correct perceptions of objects in normal circumstances, and also for those illusions which arise when impressions are produced in an exceptional way, *e.g.*, by pressing on the back of the eyeball, or by covering the eye with prisms (No. IX., pp. 12, 13, 15). Since this transition from sensation to associated idea is capable of being unfolded and expressed as an act of inference, while at the same time (in our mature minds at least) there is no distinct consciousness of the elements of immediate sensation and mediate representation, we may speak of the process as an "unconscious inference".†

The feelings which lie at the basis of the visual perception of spacial relations are first of all those which depend on the part of the retina stimulated. These are the local signs. They differ altogether in the two retinas. Respecting their exact nature Helmholtz does not think it needful to express himself. He simply says they need not be arranged in a graduated system,

* The theory of Helmholtz is unfolded in various parts of his work *Handbuch der physiologischen Optik*, see especially § 26 and § 33. See also his *Populäre wissenschaftliche Vorträge*, Second Series, p. 63, ff.

† Helmholtz seems to me to be misrepresented when he is made to say that such processes actually take place as inferences in the unconscious regions of the mind. All that his words involve is, that these unanalysable acts are susceptible of being expressed as inferences.

as Lotze supposes, but might be promiscuously distributed in any way whatever.

Besides these local feelings of the retinal fibres, there are those which accompany muscular activity. Helmholtz here distinguishes *(a)* the consciousness of the intensity of our volitional effort, or the degree of innervation; *(b)* the feeling of the tension of the muscles, that is the force with which they strive to work; and *(c)* the consciousness of the result of the effort (shortening of the muscle, altered tension of the contiguous parts, &c.). He makes most use of the first order of feelings.

Our monocular knowledge of space in two dimensions arises through the co-operation of movement (No. IX., pp. 5-7). These movements follow definite laws, not because of any innate anatomical arrangements (as is proved by the possibility of deviating from the normal combinations, though there may be an inherited tendency to follow out these combinations as the most easy. By help of these movements the eye learns the order of the points in the field of vision, that is to say, "what local signs of the sensations correspond to the points which are immediately adjacent to one another". In other words, after moving the eye over objects and afterwards fixating them, we ascertain "how two points which we have learnt by movement to be adjacent are represented in the motionless image of the eye".*

The localisation of impressions is thus definitely referred to certain feelings in some way connected with the stimulation of the various fibres. Helmholtz warns us, however, against supposing that the monocular field is constructed by a summation, so to speak, of the characteristic feelings of the nervous elements as though they constituted units of superficial space. He points to the fact that in the case of the retina, like that of the skin, the smallest distinguishable magnitudes (as determined by a bare discrimination of points) do not appear equally great at all parts of the sensitive surface.

In this way the relative position of points in any section of the visual field viewed at one moment is ascertained. In order to determine absolute direction, that is the direction of any given section of the field and its objects in relation to our body, the feelings of innervation (effort of will) must co-operate. This is proved by the facts of paralysis, giddiness, &c., already referred to (No. IX., pp. 10, 11).† The judgment reposing on these feelings

* The meaning of this might be clearer. It seems to imply that the original local discrimination only becomes effective when associated feelings of movement (Lotze's local signs) are superadded.

† According to Helmholtz, these facts prove conclusively that it is the feeling of innervation, or volitional strain, and not any feeling attending

must, however, be constantly controlled by the result, that is, the transposition of the retinal images which follows the innervation. Helmholtz explains the visual perception of distance (monocular and binocular) much after the manner of English associationists.

He thus accounts for the complicated phenomena of double and single vision. The *sensations* of the two retinas are perfectly distinct from one another. They combine in single *perceptions* only when, owing to a predominance of associations, they stand as signs of single objects. This accounts for the normal coalescence of impressions of corresponding or identical points, for the fusion of the impressions of disparate points in the perception of relief, and for the alternation of visual impression when the two fields are made quite dissimilar (rivalry of fields). Lastly, since this binocular perception is resolvable into an inference from past experiences, we are able to understand the variations which occur in the observation of double images, and of the rival fields, under the influence of a more or less vivid imagination and strenuous act of attention.*

If Lotze represents empirical psychology, burdened with survivals of Herbart's metaphysics, and Helmholtz empirical psychology in its older form as taught by the Mills, Wundt may be taken as representing this same psychology as enlarged and corrected by the addition of the ideas of racial experience and inherited acquisition. In thus taking his stand on the doctrine of evolution, he is able to mediate between the nativists and empirists.

Wundt† separates himself from Helmholtz and the English associationists on the following grounds: (1) In our visual perception of space we are said to infer from facts of past experience. But apart from the difficulties attending the conception of 'unconscious inferences,'‡ the question still remains how such

the tension or actual contraction of the muscles, which is the basis of this sense of direction.

* Helmholtz adds (*Populäre Vorträge*, 2nd Series, p. 86) that, since the similarity of localisation of corresponding regions of the two retinas does not rest on sensation, the original comparison of different linear magnitudes in each separate field cannot repose on immediate sensation. It is a little curious to find Mr. Abbot (*Sight and Touch*, p. 48) saying that single vision has never been explained on the derivative theory, without making any reference to Helmholtz's elaborate argument. This is the more remarkable as Mr. Abbott draws largely on the Germans, and even extracts two or three facts from Helmholtz's great work.

† I have confined myself here to Wundt's last and principal work, *Grundzüge der physiologischen Psychologie*.

‡ In an earlier work, *Vorlesungen über die Menschen- und Thier-Seele* (p. 58 ff.), Wundt himself distinctly accepted the idea of the logical or inferential character of the process in the perception of space-relations, and conceived this process as extra-mental or unconscious.

pre-spacial experience (whether visual or tactual, &c.) is possible. The doctrine of Helmholtz requires the supposition of an innate spacial interpretation of tactual sensations, and if this is so, it is hard to see why the same is not to be assumed in the case of the eye. Wundt is thus in favour of an independent knowledge of space-relations by the eye. (2) He objects, to the term 'association' for the process by which the space-perception arises. Association has to do only with representations which can be consciously distinguished, whereas our perception of space is made up of a number of *sensations* which fuse in a new and apparently simple mode of consciousness. The term Wundt adopts for this process is 'synthesis'.

Wundt's theory takes its start from Lotze's idea of local signs, only he thinks the differences in the feelings of ocular movement are inadequate to account for our construction of spacial extension. To these active feelings must be added certain passive sensations which constitute the real local signs of the several retinal elements, and through the coalescence of which with the active feelings the extensive form of the visual field arises.*

The local signs of the retina were found by Wundt in an earlier work (*Beiträge zur Theorie der Sinneswahrnehmung*, p. 145, ff.) in a certain 'local colouring' of the retinal sensations, that is to say, in the qualitative peculiarities of the sensations depending on the region of the retina affected.† In his latest work, however, with which we are here concerned, he attaches less importance to these,‡ and lays most stress on the sensations of touch which accompany ocular movements and depend on the varying pressure exerted on the sensitive parts of the orbit.

With these sensations are combined certain motor feelings, namely, those of innervation which accompany the process of central innervation in the act of moving the eye to the particular point indicated by the retinal impression. These feelings, unlike Lotze's 'feelings of movement,' are said to differ in their degree of intensity only, and not according to the direction of the movement, that is to say, the particular muscles acted upon.

* Lotze postulates such passive sensations as a factor in the local signs of the tactual surface.

† Thus it is known that the qualitative discrimination of impressions (*i.e.*, the sense of colour) becomes less fine as we pass from the centre to the periphery of the retina: a purple, for example, is seen as violet, then as blue.

‡ Wundt thinks we may judge of the distance of a point seen indirectly from the fixation-point more accurately by means of these qualitative differences of the retinal impression than of the sensations of touch. On the other hand we judge of relative direction by help of the tactual sensations. The same sensations tell us which of the two eyes is affected, and give us absolute direction and the erect position of objects.

The peripheral local sensations would of themselves give us the direction, but not the distance, of a point from the point of fixation. On the other hand the central feelings of innervation would supply us only with magnitude, and not with direction. The local signs form a continuum of two dimensions (answering to the vertical and horizontal directions). These dimensions, however, are heterogeneous since the local signs vary in a different way with every change in direction. The feelings of innervation, forming a continuum of one dimension, and measuring this heterogeneous continuum of the local signs in all directions, refer this continuum to a homogeneous continuum of two dimensions, that is to say, to a spacial surface.

The visual perception of space is thus regarded by Wundt as a product of the same mental process (synthesis of peripheral sensations and central feelings of innervation) as the tactual perception. What distinguishes the former from the latter is the reference of this complex of sensations to a single point, the retinal centre. This relation, which subserves the accurate measurement of the field of vision, and which first renders possible the functional combination of the two eyes in a double-eye, has its roots in the laws of ocular movement (those of Donders and Listing, No. IX. p. 5).

Since these laws have their foundation in an innate central mechanism, it must follow that the individual brings into the world with him a perfectly developed disposition to an immediate spacial arrangement of his sensations of light. At the same time it is probable that this innate mechanism itself has been slowly formed during the development of the species as an adaptation to the requirements of distinct vision with the double eye.*

In this way arises the monocular field having the retinal centre as its dominant position. The most general form of this field is the spherical surface lying about the centre of rotation of the eye. The distance of the point of fixation is of course limited by the state of accommodation of the moment.

A nearer determination of the field is effected in binocular vision in accordance with the law that both eyes continually possess a common point of fixation. At the same time the form of the field becomes more variable, since the common point of

* In this way Wundt would explain that peculiar adjustment of the forces of the ocular muscles rolling the eye upwards and downwards, to which he refers the single eye's error in the appreciation of the vertical, and which he thinks is due to the ancestral habit of moving the common point of fixation of the two eyes over receding lines in the plane of the ground (No. IX., p. 20, note).

fixation may wander over surfaces of the most unlike form.* Accordingly the combination of the systems of local signs of both eyes with the feelings of innervation is a variable one.† As to what combination of local signs and what combined feeling of innervation actually ensue, this is commonly determined by the course of the lines of fixation (contours of objects) in the common field. That is to say, those points are co-ordinated which answer to the same object-points. At the same time through the normal conditions of vision, certain limits are set to this rule; and further, the local signs of those points which answer to the usual form of the field (*e.g.*, the plane of the ground) combine more easily than others. In this way Wundt seeks to interpret the phenomena of single vision and its limitations.‡

Thus in the case of binocular vision we have to do with a more complicated synthesis than in the case of monocular vision. This may, for the sake of a clearer apprehension, be divided into two actions (which, however, are not to be thought of as actually distinct), a first through which, by means of the local signs and feeling of innervation of the first eye, the position of a given point *a* in relation to the point of fixation is determined, and a second through which then, on the addition of the second eye, the situation of the point of fixation as well as that of the point *a* in relation to the observer, is first determined.

Those directions in the field are preferred to all others, the perceptions of which by the eye in motion and at rest agree with one another. These are the lines of direction§ passing through the point of fixation, and which in narrow regions are straight lines. Only such small lengths are made use of in measuring out the field, and hence the straight line is for the eye the natural element of measurement. The nature of these lines of direction has its physiological ground in a peculiarity of our muscles, namely, that of turning their points of attachment

* When there are no circumstances (contours, fixation-points) determining the double eye to select any particular surface, its field is to be regarded as a spherical surface, of which the point midway between the two centres of rotation is the centre.

† In general the local signs of points of equal height or depth are co-ordinated, whereas the lateral distances of points whose local signs combine may vary considerably. In every such variation the feeling of innervation of the double eye is different.

‡ Wundt sums up the facts under the following law: The excitation of such points as correspond to single object-points in the great majority of instances produces a simple perception more easily than that of other points. This covers the facts of identical (symmetrically lying) points, as also those of points which only combine under some special influence (contour in relief).

§ Equivalent to the 'great circles' mentioned in No. IX., p. 6, first note.

(Ansatzpunkte) round fixed axes. This property, then, must be regarded as the reason why visual space, just like tactual space, is a plane one; that is to say, since the straight line is the element, the constitution of the surface of the field of vision requires three dimensions.

Lastly, our visual perception depends on the influence of certain associations, which, owing to their later appearance, and also to their great variability, must be regarded as of a secondary kind. Such for example is the influence of the numerous incidents which make us interpret a drawing as a representation of solid objects lying at very unequal distances from us.

In looking over these various attempts to derive the visual form of space from elementary feelings, we are struck by the part allotted to ocular movement and its attendant feelings. The study of the laws of ocular movement, and of their bearing on our visual space-construction, must be regarded as an important addition to the English empirical doctrine.

This doctrine, starting from the Berkeleyan idea of visual language, has assumed somewhat hastily that the content of our visual perception is wholly extra-optical,* that is to say, consists of representations of tactual and motor experiences of the moving organs. There seems good reason to suppose that the feelings connected with ocular movement would of themselves (apart from limb-movement) serve to generate a kind of space-consciousness. The close analogy between the muscular actions of the eye and those of the tactual organs (brought out by Wundt) supports the view that each of these senses might independently attain a space-perception having certain properties in common.†

* This does not apply to all English derivativists. Professor Bain, for example, distinctly recognises the co-operation of elements furnished by ocular movement.

† This recognition of ocular movement as an independent source of space-consciousness obviates many of the difficulties in the way of the Berkeleyan or derivative theory. Wundt's reasonings respecting the delicacy of the eye's motor discrimination (No. IX., pp. 8, 9) show that the superiority of the eye's perception, as compared with that of touch—a fact emphasised by Messrs. Abbott & Monck—is not incompatible with the theory which derives the essential content of space from motor experience. And even if it be true, as Professor Mahaffy contends (Kant's *Critical Philosophy*, Vol. I., Part I., pp. 118, 119), that the eye perceives forms on a small scale before it perceives them on a large scale (a proposition which seems very doubtful), Wundt's measurements provide a way of avoiding the conclusion that the first visual perception of form is retinal and not motor.

At the same time it is well to add that the derivative view does not depend on the accuracy of Wundt's reasoning. Even if, as Helmholtz seems to hold, the retinal discrimination surpasses the muscular, it does not follow from this that the retinal sensation furnishes any part of the material of our space-perception. It is quite open to the derivativist to say that the

What such an isolated visual space-consciousness would amount to, we can never expect to know, since it is vain to hope for cases answering to those of Cheselden and Franz, with the difference that the development of the visual organ precedes that of the organs of touch and movement.

We may, however, infer that at least such a visual perception would lack all sense of the third dimension or distance. One fails to see how the materials of feeling at the command of the eye could ever generate a consciousness of near and far. Wundt, who appears to regard the visual perception as complete, has by no means satisfactorily made out a case in favour of an independent presentation of distance. There is nothing in the feelings of accommodation to suggest distance, while the feelings of convergence are simply a mode of the same feelings which give us the two dimensions.* More than this, it seems probable that even the well-marked antithesis involved in our conception of superficial space, the vertical and the horizontal, would not emerge with any degree of distinctness in a purely visual space.†

With respect to the nature of the feelings attending movement, it will no doubt be for a long while a matter of dispute whether the feelings of innervation postulated by Wundt have any real existence.‡ On the other hand, it may be contended that Wundt ignores a part of the elements immediately given in the feelings of movement. It is not improbable that if there is a mode of consciousness attending the process of central (motor) innervation, this varies in character with the direction of the movement, that is to say, with the muscles innervated. And even if it were not so, it is to be supposed that the actual contraction of a particular muscle is attended somehow with a dis-

essential *content* of the space-consciousness is extra-retinal (motor experience of the eye, the hand, &c.), that the local reference involved in our developed retinal sensibility rests on a process of association with this motor experience, and yet that this sensibility may supply a finer scale or measure than the motor sense itself. In other words, it is possible to conceive that, when once we have learned to interpret those local differences of retinal sensation which answer to distinctly felt motor differences, we may carry the process further, and give a motor significance to still finer retinal discriminations.

* I confess that Wundt's argument in support of a visual space of triple dimensions is by no means very clear.

† Wundt, so far as I understand him, says that this antithesis is given in the tactual sensations accompanying ocular movement. But this is by no means self-evident, unless we suppose the upper and the under regions of the orbit to be already adequately distinguished by help of extra-optical experiences. It seems to me that the antithesis might be more easily given by Lotze's feelings of movement than by Wundt's sensations of pressure.

‡ Their existence is called in question by Lotze, *Revue Philosophique* October, 1877, p. 359.

tinctive feeling, which would be the rough germ of the sense of direction.

This naturally leads us to remark on the theories of local signs just reviewed. The working out of this side of the derivative theory is of great value. That the eye at rest does perceive relative direction and distance is certain; and it remained for the derivativists to account for this local consciousness attaching to the various parts of the retina. It may be said, as English psychologists are wont to say, that the visual perception of a point in indirect vision as lying to the right or left of the centre of the field, and at a certain distance from the same, involves a reference to experiences of the motor organs. Yet it is all but certain (as I have observed) that this reference is mediate in character, and proceeds by way of a more direct representation of a sweep of the visual organ itself.

As to the exact nature of these local signs, there is no doubt ample room for different theories. It may be said, however, that Lotze's scheme seems preferable to that of Wundt, in that it finds the materials of the sense of direction in the feelings of movement and not in tactual sensations. Only one would be inclined to add that these representations of ocular movement are something more than signs, since they include a part of the space-intuition itself.*

We now pass to the further question, to which these observations naturally lead up, how we are to conceive the mental process by which the space-perception arises. This will depend in part on the content we give to the space-presentation. Thus Wundt, who appears to make this content altogether optical, naturally objects to such expressions as 'unconscious inference,' 'transition from sensation to associated idea.' Yet it is

* Thus I find myself able to recognise, as a part of the content of the locality of a point at a given distance to the right of the centre of fixation, a certain kind and amount of ocular movement. To Lotze, of course, these local signs have in themselves no properly spacial character. This is seen plainly enough in the fact that the feelings of movement, in the case of the visual construction of space, have as their equivalents in the tactual construction certain passive sensations (attending the varying tensions of the skin, &c.), which sensations clearly do not involve a spacial or extensional consciousness. The 'feelings of movement' are to him *signs* which have first to be interpreted by the constructive mind. Helmholtz, who (as Stumpf remarks) does not define the sense he gives to the term 'local sign,' seems to lean to the idea that there are, antecedently to the growth of Lotze's 'signs' (feelings of movement), certain purely qualitative differences of sensation dependent on the retinal region stimulated. If this is his meaning, one could interpret the influence he assigns to ocular movement in developing local discrimination as the superposition of representations of movement on these unknown peculiarities. Yet his language is by no means clear on this point.

perhaps possible to present this very process of a reference to ocular movement as an operation analogous to an inference or a sequence of associated mental states. A perfect following out of the doctrine of the correlation of mind and body enables us to regard a process of association in its narrow sense, in which the mental elements are distinctly present, as but one case of a more general process, namely, the co-ordination of cerebral actions which, according to the degree of their connexion, and the rapidity of their sequence, have, as their mental correlatives, sometimes distinct feelings or ideas, sometimes an inseparable mass of feelings, and sometimes simply that mode of consciousness which belongs to the second and more enduring action. In this way one might conceive, for example, of the transition from some purely qualitative peculiarity of a retinal sensation (answering to the region stimulated) which was once an element of consciousness, but is now lost beneath the more important added element, namely, the representation of a definite kind of movement.*

By the use of the term 'synthesis,' however, Wundt expresses more than a peculiarity in the mode of combination, namely, the heterogeneous character of the elements which compose the space-perception. His doctrine thus distinctly raises the question: Is space a product of any one kind of experience (motor)? —Are its characteristics given in any one mode of feeling; or does it arise from a combination and fusion of heterogeneous feelings? Each view has its difficulties. If, as our own psychologists appear to say,† the essence of space is motor experience, which touch-impressions only serve to define, the objection is urged, *e.g.*, by Wundt himself, that we cannot conceive any such motor experience except as already constituted by the idea of space.‡ On the other hand, the hypothesis of heterogeneous elements

* These remarks meet Wundt's objection to the use of the term 'association'. It must be added that Wundt is not exact when he speaks of his synthesis as one of *sensations*. The only elements of sensation are the feelings of 'local colouring,' while those of touch (pressure) and innervation are representative or ideal.

† There is no doubt some uncertainty respecting this point. Even Professor Bain, who makes the muscular sense the great generator of our space-consciousness, seems to allow that tactual impressions, as elements of a series which can be indefinitely renewed in the forward and backward direction, and as coexistent feelings, give the finish, so to speak, to the perception of extension. Mr. Spencer lays most stress on this last factor.

‡ Not to speak of the yet more fundamental objection recently urged by Czolbe in his curious posthumous work, *Grundzüge einer extensionalen Erkenntnisstheorie* (p. 6), against any kind of pre-spacial experience. He says, that Helmholtz's theory, with its "inconceivable unspacialities" *(Unräumlichkeiten)* ought to be called transcendent rather than empiristic.

burdens us with the mystery of what may be called a psychical form of spontaneous generation.

I am far from saying that either of these objections is fatal. It seems perfectly conceivable that there may be moments or aspects of the feelings accompanying movement which immediately yield a vague consciousness of spacial properties or relations. That we are unable to reproduce these elementary feelings and perceptions is no objection to this theory, since *ex hypothesi* they have long since been taken up into more complex mental products. On the other hand, it is at least possible (if it were not rendered highly probable by a number of facts) that the coalescence of a mass of feelings may give rise to a mode of consciousness very dissimilar to the elements. The difficulty of imagining such a chemical fusion is greatly reduced when some of the elements may be supposed to contain the rough germ of the resulting quality.*

It may be well to add that, as long as either of the rival suppositions can hold its ground, any hypothesis of a special space-constructing or locating activity, such as that vaguely hinted at by Lotze, and more distinctly put forward by Ueberhorst, must be regarded as premature. Such a hypothesis is clearly a departure from the stand-point of the derivative theory, and a step in the direction of the intuitional theory.

On the interesting question, how far the construction of visual space is aided by inherited dispositions, little needs to be said. Wundt's view of an innate motor mechanism, the result of a gradual ancestral adaptation, so far as it is proved by the facts (No. IX. p. 5), seems to be thoroughly credible. This idea is far from endowing the infant with an *a priori* form of space. It simply gives him a facility in reconstructing his extended world. It is noteworthy that a writer like Wundt, who in his last great work ever keeps the doctrine of organic evolution in view, is contented with assigning so modest a part to ancestral experience and inheritance in the individual's perception of space. He not improbably feels the difficulties besetting the hypothesis of a transmitted blank space-form.†

* Wundt appears to overlook this altogether. He thinks an adequate explanation of space is found in the very fact of the coalescence (synthesis) of heterogeneous elements, and he expressly argues against Lotze that his local signs already carry the germ of space-consciousness. But is not this their chief merit?

† An extension of this mode of derivation, not more rash than that of Wundt's just spoken of, would be the reference of the reflex connexion between the stimulation of a given retinal point and the movement needed to shift the impression to the centre of the retina, to an ancestral habit, itself the result of a slow acquisition.

III. *Relation to the Kantian Problem.*

In concluding this brief review of the German theories of visual perception, it may be well to add one or two remarks on the relation of the question here in dispute to the philosophical problem of space as defined by Kant.

Although Kant gave the impulse to these physiological inquiries and speculations, it by no means follows that the problem with which the physiologists concern themselves is the Kantian. In truth we may rather expect the opposite, since questions of physiology and empirical psychology are quite distinct from properly philosophical questions. This remark has been insisted on with characteristic energy by W. Tobias, who resolutely combats the idea that the question of Nativism and Empirism is the Kantian problem at all. (*Grenzen der Philosophie*, chap. iv.) He says the point of dispute is "purely empirical," "purely one of natural science," namely one concerning an order of events in time (p. 110). Let us see how far this is correct.

There are two things to be distinguished here—the originality of the idea of space, and its subjectivity. Kant asserts the former, in so far as he says that no sensuous experience is possible without the form of space. Now the derivative theory distinctly maintains the existence of sensation prior to the construction of the space-idea. Even the modest assumption made by Lotze that sensations of colour are present in the infant mind before the local signs develop themselves—is to a certain extent a negation of the Kantian idea. The question, then, though undoubtedly one of events in time, as Tobias asserts, distinctly touches one part of the Kantian problem.

The essence of Kant's doctrine however relates to the question of the independent reality of space. Let us see whether the dispute just reviewed has any relation to this question.

We may here distinguish between two kinds of reality, phenomenal or relative, and noumenal or absolute. To these there correspond two questions: *(a)* How does visual space acquire that phenomenal reality which all agree in attributing to it? This question may be otherwise put: How do we come to see objects (phenomenal realities) in space? *(b)* The second question is: Does visual space answer to any noumenal reality wholly independent of the mind?

(a) It is clear that the peculiar doctrine of the Nativists provides no way of answering the first question. The mere fact of an original sensuous space contains no explanation of the objectivity (phenomenal reality) given to the intuition. On the other hand, the empiristic doctrine in one of its forms (as ap-

proximately represented by Helmholtz) does offer an explanation of this reality.* The reality of visual space to the modern English followers of Berkeley means the opposition of certain feelings (motor and tactual) to the present consciousness which merely represents these. Thus the reality of the space we see, and at the same time the externality in space of the objects we see, are accounted for in the very process of explaining the space-perception itself.

It remains, therefore, a question how the Nativists are to account for the reality of visual space, and at the same time for that correspondence between visual perception and tactual experience, which the Empirist is able to regard as involved in the very genesis of the former. In order to do this they must have resort to some properly metaphysical hypothesis. The reality and unity of space may be referred (as by Kant) to a single subjective form, which is applied alike to all varieties of sensation, and the application of which itself gives reality (objectivity) to impressions. Or they may be explained by saying that each of the senses immediately perceives one and the same noumenal reality.

(b) We are now prepared to see what the question between Nativism and Empirism has to do with the ontological problem respecting the independent reality of space. As I have just hinted, the Nativist may be just as easily a Realist as an Idealist (Kantian). In either case the originality of the visual perception, and its agreement in the case of vision and touch, would be equally well accounted for. On the other hand, the derivative theory, so far as it resolves the external space perceived in vision into a phenomenal reality (motor and tactual experience), may be said to discountenance the idea of a noumenal space by rendering it an unnecessary hypothesis. Yet, as I have remarked, the derivative view does not necessarily identify visual space with any definite mode of (represented) experience. Lotze, for example, says that visual space is something quite different from the feelings of movement which subserve its construction. Consequently the question still remains open whether the idea is purely a mental (subjective) creation, or answers to something independent of the mind. Thus just as it is possible for a Nativist to be a Realist, so it is possible for an Empirist to be a Kantian Idealist.

It may perhaps be objected that the derivative theory, by speaking of distinct sensory nerves and muscles—that is to say

* Of course this does not apply to the theories of Wundt and Lotze, which regard visual space as different in kind from the experiences out of which it is constructed.

of objects having spacial relations—as the antecedents of our space-consciousness, does all the time assume the independent and absolute existence of that very space the origin of which it seeks in a certain mode of feeling. To this it is enough to reply, that workers like Helmholtz and Wundt occupy themselves solely with the empirical problem of accounting for the genesis of the space-perception in the individual mind, viewed as an objective process, that is to say, by another mind. To A, with his developed space-consciousness, the rise of B's space-consciousness presents itself as a sequence of definite feelings on definite material processes (nerve-stimulations) in space. B is able to view the genesis of A's space-consciousness in a similar way. Now it may be that the observer in each of these cases is, after all, conceiving under these material processes in space nothing but a mode of his own (or some third person's) feelings (motor and tactual). And thus it is clear that the genetic method, in connecting the perception with certain physical antecedents, makes no assumption respecting the independent existence of space.

JAMES SULLY.

III.—NOTES ON THE PHILOSOPHY OF SPINOZA

IN the spring of last year I had the honour of giving a Friday evening discourse on Spinoza at the Royal Institution which is printed very nearly as it was delivered in the *Proceedings of the Royal Institution* (Vol. VIII., p. 363). The wise custom which as a rule confines the length of such discourses to one hour imposed on me an amount of condensation which, however necessary for the spoken word, would be needless and unsuitable in a paper intended for the readers of MIND. The present article contains a more developed statement of points which, at the Royal Institution, I could merely indicate. In the course of my work on the subject I have received valuable communications from several friends, and I take this opportunity of acknowledging once for all in a general form obligations which it would be difficult to specify accurately or adequately in detail.

It may be taken as determined beyond question that in the *Ethics* of Spinoza we have one of the most remarkable achievements of constructive philosophic genius ever given to the world. In philosophy, however, as in literature and art, the power which stamps a man's work as eminently his own is to be sought not in the part but in the whole, and a true master's fame has nothing to fear from the utmost that critical

research can do in tracing back to their sources the elements he wrought upon. As Prof. Land of Leyden well says (in his recently published lecture, *Ter Gedachtenis van Spinoza*, where much valuable matter, both historical and critical, may be found in a small compass), "originality consists, not in a man's producing every element of his work by himself, but in his binding together existing elements in a new combination which bears the stamp of his individuality, and leaves its mark behind it in the work of others". The steady light of great men's renown shines on long after the passing dazzle of so-called originality has disappeared. After all, what would a perfectly original idea be but an idea having no relation to the time, place, and circumstances in which it was put forth, and therefore hopelessly barren? True creation is not to make out of nothing, but to make new life out of the heritage of the past. In Spinoza's case there has been too much dazzle; the system of the *Ethics* seemed to have sprung from his brain armed at all points, and his conceptions, while they stood out in abrupt and isolated grandeur, have been more admired than appreciated. Leibnitz indeed asserted, and it has remained a sort of tradition in a certain school of philosophy to assert, that Spinoza did nothing but carry to an extreme development one side of the principles of Descartes. This position seems to me, I confess, so untenable that I can only wonder at its being still maintained by any competent person. M. Francisque Bouillier *(Hist. de la Philosophie Cartésienne)* adheres to it with very little qualification, and in particular minimises the importance of Spinoza's Jewish predecessors. It is fair to note that Dr. Joël's evidence was not before him. But Prof. Caird, with that evidence before him, has also taken the same line in his article on 'Cartesianism' in the *Encyclopædia Britannica*. I can account for it only by the exigencies of some pre-conceived or pre-adopted theory of what the history of philosophy ought to have been.

There is no doubt an unmistakeable Cartesian element in Spinoza, more especially in his form and method; and Descartes may also claim—what is more important than any particular doctrine—to have taught him that philosophy must thoroughly assimilate the lessons of natural science before she attempts any flight outside their range. The most striking specific points of Spinoza's philosophy remain, however, unaccounted for by Cartesian sources, or by any other sources that were open to him in common with the general world of letters. Only of late years the riddle has been solved, partly by the discovery of new materials for the history of Spinoza's own thought, but chiefly by the light thrown upon his already known works from an unexplored and, strange to

say, unexpected quarter. It was for a long time assumed by historians of philosophy that, after he was cut off from the synagogue of Amsterdam, Spinoza had no further use for Jewish learning save for polemical purposes; and the assumption was the more convenient, inasmuch as that learning was outside the accustomed lines of western culture, and not easily accessible to any but Orientalists. It was reserved for scholars of Spinoza's own race to make good the share of the Jewish philosophers of the Middle Ages in the quarries whence the stones of his building were hewn. This work, begun by Auerbach, has been lately carried out by Dr. Joël of Breslau, who in a series of valuable monographs (now collected)* has given us a far juster notion than was before attainable of the resources Spinoza had at his disposal in the modern literature of his own people. I will now give a condensed account of the results of this line of inquiry, so far as known to me at present, collected from Dr. Joël's work and elsewhere. The simplest way is to take the leading names of mediæval Jewish philosophy in chronological order.

1. *Avicebron.*†

Ibn-Gebirol (d. at Malaga 1070) belongs to the earliest generation of Jewish philosophers, and is not the least striking figure among them. There is reason to think that some at least of his ideas found their way to Spinoza, but it was by a strangely circuitous road. In his day the Aristotelian doctrine, which so long held undisputed sway in both Jewish and Catholic schools, was still struggling with Neo-Platonism, and it was chiefly with Neo-Platonic materials that Ibn-Gebirol constructed his own brilliant and rather eccentric speculations. Honoured but little among his own people, he was soon overwhelmed in the Peripatetic flood, and entirely forgotten as a philosopher. Meanwhile his principal work had been translated into Latin under the name of *Fons Vitæ*, and became well known to the founders of the Scholastic philosophy. The author's name was concealed under the Latinised Avicebron, and by a sort of unreasoned mental attraction he was set down as belonging to the Arabian group headed by Averroes and Avicenna. It was only in late years that the sagacious industry of the late Dr. Munk re-discovered in the unknown Avicebron the Jew Ibn-

* *Beiträge zur Geschichte der Philosophie*, Breslau, 1876. I cannot help finding one fault with Dr. Joël's work: he seems to assume that all his readers will be Hebrew scholars, and often gives long extracts without a translation.

† See Munk, *Mélanges de Philosophie juive et arabe;* Lewes, *History of Philosophy*, II. 61.

Gebirol. The *Fons Vitæ*, however, fell in due time into the hands of Giordano Bruno, who received it with a much more kindred spirit than Aristotelian orthodoxy had done. Bruno repeatedly cites Avicebron with approval, and there is a good deal of likeness in the general strain of their speculation. The ideas thus taken up were passed on in turn to Spinoza, who can never have even suspected how much nearer to him their real source was. Spinoza's relation to Giordano Bruno has been exaggerated in some quarters and ignored in others. It is enough to say, however, that there is no external probability against Spinoza having been acquainted with the main contents at least of Bruno's works, and the internal evidence in favour of it is all but irresistible. It may remain, perhaps, an open question whether Spinoza had read the actual text of Giordano Bruno, though there is no reason why his knowledge should not have been at first hand. There can also be little doubt that the terminology of Spinoza's metaphysic (as to attributes and modes) was suggested by Giordano Bruno. But of Spinoza's precision in the use of terms there is no trace in Bruno, who is everything but systematic.

The element specially contributed from this quarter to Spinoza's philosophy is that which has caused it to be commonly ranked as pantheism—the speculative delight in the conception of the world as an infinite unity, wherein all the varieties of finite existence are welded into one without losing their reality. Spinoza's philosophy is utterly remote from the Oriental pantheism which denies reality to finite things. People who talk of "Pantheism from the Vedas to Spinoza" for the purpose of showing that Spinoza produced only a new variety of ancient error show nothing but that they have either neglected to procure ordinary information, or are incompetent to discuss philosophy at all. It is needless to remark that the pantheism of developed Hindu philosophy is in fact later than the Vedas by a number of centuries not yet accurately determined. It is surprising, however, to find such a writer as Prof. Caird countenancing the vulgar error by speaking of "the Spinozistic pantheism that reduces the world and the finite spirit to an illusion". We shall shortly see that another Jewish predecessor may likewise claim a share in this element.

2. *The Jewish Peripatetics.*

Partly coinciding in time with Catholic Scholasticism, but with its rise and culminating period nearly a century earlier, a series of Jewish philosophers in Spain, Provence, and the East, did work which has a far more important place in the general history

of philosophy than has commonly been allowed to it. The task they set themselves was the same in kind as that of the Schoolmen, who, in spite of religious difference, joined hands with them on the common ground of Aristotle, and used their work with open acknowledgment and respect. They strove, in one word, to systematise theology on an Aristotelian footing. For this purpose it was necessary to embark on a critical and philosophical interpretation of Scripture; and in this undertaking the comparatively undefined character of Jewish orthodoxy secured them a certain amount of freedom.* Or rather philosophy presented itself to Jewish speculation as an enlightened interpretation of the hidden meaning of the law. Thus Moses ben Maimon and Ibn Ezra were leaders in biblical criticism no less than in philosophy. The ideas they put forward in this field were to be carried out to their full development in the *Tractatus Theologico-Politicus*. Spinoza's object is indeed opposite to that of Maimonides; so far from finding philosophy in the Scriptures, he maintains that it is idle to seek it there; and the sharpness of his criticism on Maimonides's artificial system of interpretation has probably distracted attention from that which they really have in common. Maimonides' work was continued by Levi ben Gerson, or Gersonides (born at Bagnal in Provence in 1288, living in 1340), who, professing to be a mere interpreter of the Scriptures and to rely on them as the source of every kind of knowledge, was at the same time more thoroughly Aristotelian than his predecessors. The discovery of Aristotelian metaphysics in the Song of Solomon was probably the extreme feat of the Jewish theologico-philosophical dialectic.

The influence of these writers on the purely philosophical part of Spinoza's work was comparatively slight: it is perhaps not too much to say that there are only traces of it in the *Ethics*. Still the points of affinity are notable. The following are specimens of those which may be found in Maimonides' great work, the *More Nebuchim*.†

The will and the wisdom of God are regarded as inseparable. And not only is there no real distinction between the divine attributes, but no attribute whatever can be predicated of God in

* The Mahometan schools enjoyed the same advantage. Strictly speaking, neither Judaism nor Islam has any dogmatic theology at all. At the same time there must have been in practice a good deal of restraint. Maimonides expressly warns his readers that on many points he will be deliberately obscure; and Ibn Ezra could only hint with elaborate mystery that "the Canaanite was then in the land" could not have been the language of Moses' generation. The intervals of absolute silence in his commentary on Isaiah are even more significant.

† Edited by Dr. Munk, *sub tit. Le Guide des Égarés*, with literal French translation.

the ordinary sense—even eternity and existence, as applied to him, are merely *homonymous* with the same terms in any other application (c. 56 *et alit.*). This however is by no means peculiar to Maimonides.

The existence of God is involved in his essence ; otherwise of the existence of any finite creature, which may be considered as an accident in the logical sense (cc. 57, 58).

God coexists with the creation as its cause *in actu*, not as a cause *in potentia*, which precedes the effect in time.*

Perfect intellect forms no conception of good and evil, only of true and false. Such was the first state of Adam. Good and evil belong to the region of probable opinion (c. 2).

Dr. Joël also calls attention to Maimonides' reflections on final causes as being fitted to prepare the way for Spinoza's entire rejection of them.†

3. *Don Chasdai Creskas.*

Chasdai Creskas (of Barcelona, *fl. circ.* 1400) broke with the Peripatetic tradition to strike out an independent line of his own. Several of the most characteristic points of Spinoza's philosophy—some already well developed—are found in his *Or Adonai* (1410).

He censures as fallacious the notion of infinite extension being made up of measurable parts (Spinoza, *Eth.* i. 15, schol., *Ep.* 29): he also holds matter to be eternal, the act of creation consisting only in the ordering of it; and maintains that the material world, being (as known by revelation ?) good in its kind, partakes of the Divine nature. The contrast of this with the Cartesian theory of substances distinct *in genere* probably had something to do with Spinoza's conception of extension as an attribute co-equal with thought.

Again, the perfection of God consists not in knowledge, as the Aristotelians say, but in love. This love is what determines God to creation as a necessity of his nature, and nevertheless an act of will. Love being the chief attribute of God, the perfection of any creature depends on the extent to which it shares in this : thus the love of God (for its own sake, not as a means of salvation) is the chief end of man. Here we get some light on the fifth book of the *Ethics* of Spinoza, which has always seemed

* Cap. 69. One may be allowed to note (though not here relevant) Maimonides' answer to the standing question why the world, if created in time, was created at one time rather than another. He says it is just like asking why there exists a certain number, neither more nor less, of individuals of any kind—*e.g.*, the fixed stars.

† *Zur Genesis der Lehre Spinoza's* (in *Beiträge zur Gesch. d. Philos.*)

to me the most obscure part of his philosophy both in itself and in relation to the rest. Perhaps Orientalists may have yet more to tell us on this head.

Most remarkable of all, perhaps, is Chasdai's thorough determinism. He explicitly denies that any event, whether depending on human choice or not, can be called possible or contingent in an absolute sense. It is inconceivable, he says, "that two men, being themselves of like temper and character, and having before them like objects of choice in like circumstances, should choose differently". Volitions are determined by motives as much as anything else in nature is determined. An act of free will is *free* in so far as it is not *compelled*, but *necessary* in so far as it is not *uncaused*. Reward and punishment are themselves parts of the necessary order of things, attached however by Providence, for reasons of policy, to those actions which are free in the popular sense—that is, which are determined by a state of mind involving the love of God or its contrary. The argument on this topic seems to be fully worked out, and to deal with most of the points that have been made in later controversy on the subject. Chasdai holds fast, it must be remembered, to the idea of *designed* order in the universe, though final causes in the ordinary sense are as it were swallowed up in the absolute, self-sufficient necessity by which God's love manifests itself. Thus he cannot be regarded as a forerunner of Spinoza's system; Spinoza took the suggestions in detail and worked them into a systematic connexion of his own, which would probably have found little favour in Chasdai's eyes.

As to Descartes, Spinoza's philosophical relation to him has been so amply discussed that there is no occasion to dwell on it. I doubt, however, whether justice has been done to the scientific side of it. A clear grasp of physical conceptions and a careful avoidance of mistakes in physical science are prominent in Spinoza's work. That the spirit of exact science must go before the spirit of philosophy, if philosophy is to be more than a plaything, was a precept which Spinoza might learn from Descartes, and from him alone. I must add nevertheless that I do not agree with those (including Dr. Joël) who hold that Spinoza was at any time a Cartesian. All the evidence we have goes to show that such a time, if any, must have been exceedingly short. The early *Essay on God and Man* is little, if at all, more Cartesian than the *Ethics* in its general principles, though doubtless much more Cartesian in detail. The account of the passions follows pretty closely Descartes' *Traité des Passions:* yet the differences are already important. Of Descartes' elaborate physiological explanations there is not a word, an omission which we may

fairly interpret by the light of Spinoza's later criticism. Descartes asserts that all the passions are in themselves good, and only their excess is harmful; sorrow has its place no less than joy, and is even "en quelque façon première et plus nécessaire". Spinoza denies it even more sharply than in the *Ethics*, rejecting hope, fear, and all passions derived from them, as unworthy of a wise man's life.

As to the *Principles of Cartesian Philosophy*, I can see no sufficient reason for doubting Spinoza's own account of the circumstances under which that work was produced. He was unquestionably not a Cartesian when it was put into shape for publication; and if we may trust his own words, he was not so at the time of giving the private lessons that were the foundation of it (*Ep.* 9). In short, at the most important time of his growth Spinoza necessarily breathed a Cartesian atmosphere, just as a century and a half later he would have breathed a Kantian atmosphere: but it is a long way from this to making out a case of subordination or even of direct descent.

When everything has been said about the sources of Spinoza's philosophy, or rather of the several elements combined in it, the whole remains as much his own as ever. Nothing more strongly shows its individuality than the extreme difficulty of making it fit into any of the usual classifications. It has been called by every possible name, but the more one considers it, the more it refuses to be put into any of the pigeon-holes labelled with words in *ism*. Every name is found to halt somewhere in the application except those which are too vague to convey any real information. There is no pleasure and small profit in discussing the various attempts of critics to mete Spinoza with their various little measures. It is simpler to give the reader an earnest warning once for all not to take upon trust any statement, especially any hostile statement, of Spinoza's doctrines. The use of good expositions is to send one to the text; and this is eminently the case with Spinoza. I know of hardly any philosopher since Plato who loses so much in being reported at second-hand.*

The reader of the *Ethics* is startled almost at the threshold—

* The best general account is Kuno Fischer's. Of distinctly adverse critiques the best I know is Saisset's; for M. Paul Janet's excellent papers on Spinozism can hardly be classed under that head, though his philosophy is widely different from Spinoza's. One or two which have lately appeared in sectarian journals in this country are beneath serious notice. John Howe's *Living Temple* (1702) deserves remark as containing the first English polemic against Spinoza. The argument never gets beyond the definitions of substance and attribute. Howe shows no sign of really understanding Spinoza, and I suspect that he had not read more than the first Part of the *Ethics*.

many I believe are deterred—by the theory of the Attributes. This, if it is nothing else, is one of the most brilliant *tours de force* ever achieved in metaphysics. Looking at the matter in a purely scientific spirit, I suppose we must not approve *tours de force* on any terms. Yet it is impossible to refrain from admiring a flight of speculation which is guided in the very height of its daring by the finest possible sense of the dangers to be escaped on either hand. In the light of more recent controversies one is almost tempted to call it a prophetic tact. Those who maintain that the methods of scientific inquiry, if good for anything, are good for the whole field of human knowledge, have ever been assailed by the cuckoo cry of materialism. They are charged (in almost every case most unjustly) with seeking to reduce all being to that which can be touched and tasted and handled. Spinoza soars at one stroke to a height where this cackling is inaudible. The material world, or to speak with Spinoza, the world perceived under the attribute of extension, is complete in itself; the laws of matter and motion are our sole and sufficient guides to the understanding of it. But this is not the whole world. Extension is only co-ordinate with thought and with infinite other aspects under which existence may present itself to other intelligences than ours. Extension is not after the other attributes, but it is not before them. The universe in its conceivable though not imaginable fullness is infinitely beyond any sensible world. Whatever else Spinoza's system may be, it is not materialism or naturalism. We know, again, how many flying from the Charybdis of materialism have been wrecked on the Scylla of idealism. They have sought to bring the unruly world of things into subjection by making it out a mere creature of thought. They have turned the realities of common life into a phantom show deceiving the self that brought them forth. But a sure Nemesis awaits all such attempts to spurn the conditions of existence: the self thus made the measure of all things has at last no assurance of its own reality. The cure prescribed for materialism turns out to be the heroic remedy of absolute scepticism, and from this worst fate of all a fresh escape has to be sought in some violent assumption. A very few bold and honest speculators, such as Fichte, make their assumption openly, but as a rule it is more or less elaborately disguised. Spinoza saw the net spread for the tribe of modern idealists, and he would have nothing to do with a phantom universe. Extension is as real as thought, or rather they are one and the same reality. I am real in exactly the same sense that the world I live in is real, and we are each other's sureties, if the expression may be allowed, that the whole thing is not one vast illusion. It is needless to say however that this language is not Spinoza's;

the questions it suggests are nowhere explicitly discussed by him. For my own part I do not think any theory of perception can be satisfactory which treats man as a mere individual. I believe that a human being's assurance of the reality of things outside him is inseparably connected with his assurance of the reality of other people, and I half suspect that the latter really comes first. Some social feelings are probably inherited, and social feelings involve the belief that your fellow is as real as yourself. But to dwell on this would take us much too far from Spinoza.

The question remains, and is a fair one, whether Spinoza's metaphysic, though it steers clear of subjective idealism as well as of materialism, is not in some sense idealist after all. The infinite attributes—which are of no practical use, as our knowledge is limited to those of extension and thought—seem at first sight designed to avoid such a result. The ideal or psychical order of the universe is merely one of infinite orders, all strictly homologous with one another and with the ideal order, while differing in kind. So in plane geometry we may conceive figures similar and similarly situated to those we are dealing with to be repeated in an infinite number of planes other than the plane of the paper. But the descent from this conception to our finite experience is not made out. I do not mean only that no reason is given why finite things should exist at all, why there should be variety among them, why they should be as they are and not otherwise, and the like. That class of questions may well be put aside, and Spinoza did expressly put them aside, as being irrational *(Ep.* 72*)*, and accordingly divers ingenious persons have first assumed that Spinoza meant to answer such questions, and have then proved, much to their own satisfaction, that he did not succeed in answering them. But the relation of thought to the other attributes remains obscure. Man is an extended and thinking being, and nothing else. How does Spinoza account for his being nothing else? What becomes of the infinite modes of other attributes corresponding to the mode of extension which is the human body? Spinoza seems to say that each of these has a finite mind to itself: and that besides all these there is an idea or mode of thought* not in any finite mind *(in infinito Dei intellectu)* which in some way more eminently corresponds with all the homologous modes of the other attributes.† This leads

* *Idea* in *Spinoza's* usage=mode of the Attribute *cogitatio*, not necessarily in a human or conscious mind. It would include Prof. Clifford's "elementary feeling" or "piece of mind-stuff".

† Correspondence between Tschirnhausen and Spinoza (*Ep.* 67, 68). Spinoza's answer is only a fragment, and I must confess that after repeated

us into regions where articulate speech becomes impossible, and we can only manipulate symbols of imaginary quantities. Meanwhile the definition of Attribute is itself idealist in its language: "Per attributum intelligo *id quod intellectus de substantia percipit* tanquam eiusdem essentiam constituens". This seems to cut the ground from under the equality of the Attributes; and if they are not equal, their infinity will hardly serve its purpose. Now the insoluble puzzles we have just glanced at arise wholly from the infinity of the attributes — in other words from the attempt to make the world of experience carry the burden of worlds beyond experience. The real working parts of Spinoza's system, which are naturally concerned only with the world we do know, remain substantially unimpaired when these brilliant but dangerous ornaments are given up. The conception of Substance and Attribute taken not merely from the definitions, but as we find it worked out in the second and third parts of the *Ethics*, leads to such a view of the relations of mind and matter as is now called Monism; and herein Spinoza's position is at least compatible with an idealist Monism such as my friend Professor Clifford has lately advocated. Some such conclusion, I believe, is that to which philosophy and science are now converging. The dualism of matter and mind is becoming not only inadequate but unthinkable. Mr. Lewes, Mr. Spencer, Professor Huxley—yea, the new Oxford school of Hegelians, though in a speech hard to understand—are all telling us the same story in their different ways. The greater part of what is denounced as "scientific materialism" is only very good Monism. If any one expects to build up a soul out of soulless atoms, it is not Prof. Tyndall or Prof. Huxley. The life-potent atom of the Belfast address is not a piece of the old material substance of the schools. It is rather a monad instinct with its share, however lowly, of mind, soul, spirit, or whatsoever name may be given to that very certain reality which finds its highest known manifestation in the consciousness of civilised man. We can now less than ever admit a break in nature in either the material or the mental aspect of life: neither can we stop even at the old break between the organised and the unorganised world. It will one day be understood that Mr. Darwin has made materialism impossible. The people who still cry *materialism* may perhaps not find scientific idealism much more to their taste: but that is another matter.

Let us turn to Spinoza, and we shall find that the very keystone of his psychology is this principle of con-

consideration I do not fully understand it. I doubt whether Spinoza was quite satisfied with it himself. See *Ep.* 72.

tinuity, apprehended with a firmness of mental grasp, and carried out to its results with a thoroughness and clearness which have been surpassed by no modern writer. The distinction between mental and material phenomena, which forces itself upon man as soon as he begins to think at all, leads him to conceive of mind and matter—the regions of inner and outer experience—as two distinct worlds set over against one another and separated by a great gulf. The philosophers of all ages have busied themselves with attempts to bridge this gulf, which have all failed. We are delivered from floundering in pathless contradictions, and consequent invocations of some *deus ex machina*, only when we perceive that the gulf itself is the creature of our own thought. The question put in the dualist form—How does Mind act upon Matter?—is irrational and insoluble. The Cartesians and afterwards Leibnitz, perceiving this but clinging to the notion of mind and matter as distinct entities, were led to the devices of Occasional Causes and Pre-established Harmony.* Spinoza, for his part, rejects the two entities. The distinction between the physical and the mental order of phenomena is made sharper than ever: no link in the one series can be a link in the other, so that to speak of will, for instance, as possibly a form of energy is to put words together without meaning: but this is just because the two series are the diverse expressions of one and the same reality. If the rough comparison of the clock may pass muster at all, we must speak not of two clocks, but of one clock with two faces.† It will be observed that Spinoza does not assume an unknowable reality behind the manifestations. I think he would have said, agreeing herein with Berkeley, Ferrier, and idealists generally, that unknowable reality (that is, unknowable absolutely, not merely to us) is a contradiction in terms. Now I am far from saying that Monism, in Spinoza's or any other form, is demonstrated. It seems very doubtful whether any proposition about the relations of mind and matter is capable of demonstration. We may be satisfied if we get a conception which is consistent in itself, involves the least possible amount of assumption about the ulti-

* The doctrine of occasional causes is not in Descartes himself: he seems to have formed no distinct theory. Leibnitz's simile of the two clocks is also found in Cartesian writings. See the quotation from the editor of Geulincx's posthumous *Ethics* in Bouillier's *Hist. de la Philos. Cartésienne*, I. 305 (3d ed).

† For the fuller setting forth of all this see Mr. G. H. Lewes's last volume of *Problems of Life and Mind*. Compare also Dr. S. E. Löwenhardt's *Benedictus von Spinoza in seinem Verhältniss zur Philosophie und Naturforschung der neueren Zeit*, Berlin, 1872—where the harmony of Spinoza's doctrines, especially on this point, with modern science, is discussed with much vigour and ability.

mate nature of things, and above all conforms to the scientific postulate of continuity. Prof. Tyndall has observed (*Fortn. Rev.*, Nov. 1877, p. 607): "It is no explanation to say that the objective and subjective effects are two sides of one and the same phenomenon". If I may say so without presumption, I entirely agree. It is not an explanation, but a statement which puts us on our guard against fallacious shows of explanation and helps us to see that no real explanation is possible, or that the further question (to take it in Prof. Tyndall's form): "Why should the phenomenon have two sides?" is in its nature unanswerable. The point of the monistic hypothesis, it must be repeated, is that the two-sidedness does not emerge abruptly in the consciousness of vertebrate animals or at any other point in the scale of organic nature, but runs through all phenomena whatever. The water that "runs into frost-ferns upon a window-pane" certainly does not think. It is fairly certain that it does not in the popular sense feel. But that it does not in some sense feel appears to me a very rash assertion indeed, and savouring of a dogged and desperate materialism. And it is of no possible scientific use. The monistic conception may at least serve to keep the provinces of physics and metaphysics distinct, and (if I may repeat an expression I have used elsewhere) to save metaphysics from degenerating into bad physics. And it has a real practical value in teaching us what to expect and what not to expect from physiology. It shows us the importance of observing vital phenomena from the physical side, while it guards us against materialism. This did not escape Spinoza, who says—after asserting the exact correspondence of body and mind, as representing a substantial identity* — "Hence we understand, not only that the mind of man is united to the body, but what is to be understood by this union: yet the same cannot be understood adequately or distinctly without first having an adequate knowledge of the nature of our body:" and he goes on to state, briefly but unmistakeably, that everything has a share of life, and that the degree of life depends on—or rather *is*—the degree of organisation.† The power of the psychological method thus obtained is shown by the ease with which, a few propositions later, Spinoza anticipates the modern doctrine of Association, and that on its physiological side.‡

Even more remarkable is the theory of Desire in the third part of the *Ethics*, and the treatment of the Passions founded

* Mind and body are "*unum et idem individuum, quod jam sub cogitationis, jam sub extensionis attributo concipitur*". *Eth.* ii. 21, schol.

† *Eth.* ii. 13, schol.

‡ Propp. 17, 18.

upon it. For the scientific worth of Spinoza's results it is enough to quote the testimony of Johannes Müller:—"With regard to the relations of the passions to one another, apart from their physiological conditions, it is impossible to give any better account than that which Spinoza has laid down with unsurpassed mastery. In the following statement I shall therefore confine myself to giving the propositions of Spinoza on that subject."* And this he does accordingly, without further criticism or comment.

Spinoza reduces the passions to the elements of pleasure, pain, and desire. Pleasure is defined as the passage from less to greater, pain as the passage from greater to less perfection. This is singularly like the account of pleasure and pain lately given by Mr. H. Spencer on biological grounds—namely, that pleasure is originally correlated to actions beneficial to the organism, pain to those which are injurious to it. Desire does not mean for Spinoza a desire of pleasant things as such. All living things, whether conscious or not, have *appetite*—a physical impulse determined by the universal tendency or *effort*, as Spinoza calls it, towards self-preservation. Desire is conscious appetite, and as such is prior to the voluntary pursuit of pleasant things as pleasant. Pleasure and desire are related not as cause and effect, but as effects of a common set of causes or functions of the same conditions. This appears to me truer, deeper, and more fruitful, than the current modern notion that desire consists in the conscious pursuit of something already deemed to be pleasant. Spinoza's conception is also far more consonant with what science has now taught us to think of the history of life on the earth. The self-preserving effort of all things—"conatus quo unaquæque res in suo esse perseverare conatur"—does not seem, as it stands in the *Ethics*, to be sufficiently connected with the living world. There is a gap left open between the idea and the facts. But the wonder is that Spinoza left it open exactly at the right place. He could not have filled it in adequately with the materials he had, and he had the wisdom to let it wait. The theory of Evolution has now supplied the moving force that was wanting. The impulse, older by countless ages than conscious desire, older even than anything to which we grant the name of life—

> "The will to live, the competence to be,"

this is now in the sight of all men, even as it was for Spinoza's keener vision, the root of all action and of all that makes the world alive. If Spinoza had not the advantages of modern supporters of evolution, he was free from some of their tempta-

* Müller, *Physiol. des Menschen*, vol. ii., p. 543.

tions. He never hypostatises the universal *conatus*, as some have done in our own day, into a sort of unconscious Providence, nor does he fall into a confused nature-worship. Still less does he discover in all the workings of the world the vast plot of a blindly-cunning power to deceive every creature into keeping up the supreme evil of life. For him the universe and the natural order of things are in themselves neither good nor bad, those terms having no meaning except in relation to the welfare of some individual or kind.

True to the principle of continuity, Spinoza does not hesitate to carry this same conception into the field of moral action. Here as elsewhere the self-preserving *conatus* is the ultimate fact of life. "The foundation of virtue is no other than the effort to maintain one's own being, and man's happiness consists in the power of so doing."* But this does not lead—as might be supposed, and is now and then supposed by persons who have not read Spinoza to the end—to a system of selfishness or even of rational egoism. For Spinoza treats morality from a completely social point of view, as the business not of the individual simply, but of the individual living in a society in whose welfare he must find his own. He does not stop to prove that it is for the interest of the individual to promote the common weal; he simply appeals, in effect though not in express terms, to the fact of experience that man is a social animal. "Homini nihil homine utilius." In this frank assumption of the essentially social character of morality he is at one with the Stoics.

Throughout his ethical doctrine, indeed, the parallel with the Stoics is of the most striking kind. The Stoic principle of "following nature" as explained by the Stoics themselves, is really identical with Spinoza's "suum esse conservare". In both systems we start from the position that as a matter of fact man's nature is social: and then the application of the general principle to man as a social animal leads to the conception of morality and virtue as aiming at the welfare of the community before that of the individual. The reasonable man ("qui ex ductu rationis vivit," and, by a still more singular coincidence with Stoic speech, "homo liber") must seek his own weal in the common weal. In both systems again, all men, good and bad, fulfil in some way the universal and necessary order, being themselves part of it; but the righteous man fulfils it with willing consciousness, thus doing a service which is perfect freedom, and therein finds his sure and sufficient reward. Can all this be coincidence? At first sight it is hard to think so; but on the whole I do so think, for the very reason that the resemblances go so deep

* *Eth.* iv. 18 schol.

down. They are not of the kind that would result from a second-hand acquaintance with Stoicism, such as might be got, for instance, through Cicero. If it were so, one would find Stoic forms and phrases, or at least reminiscences of them. But Spinoza's language is all his own. And an acquaintance at first hand is very unlikely. Of Plato or Aristotle, at least, Spinoza must have known very little to speak of them as he does, putting them aside as mere fathers of scholastic figments, not to be listened to by reasonable people (*Ep.* 60, *ad fin.*). And there is no reason to suppose that he thought later Greek philosophy more worthy of attention. We have, moreover, his own statement that his knowledge of Greek was imperfect.

In his estimate of the extent to which the conditions of happiness are under man's control, Spinoza goes a good way with the Stoics, and with them also he qualifies the practical effect of this estimate by saying that the life of wisdom, though possible, is so hard that very few find it. There is, however, nothing to correspond to the famous paradoxes. These were simply unflinching deductions from the teleological optimism which was a fundamental principle of the Stoic system but has no part in Spinoza's. Epictetus would preach to a man with a toothache that toothache is not really an evil, but is to be accepted as a necessary part of an order which is absolutely good. Spinoza would say that the facts constituting a toothache are, in themselves, as part of the order of nature, neither good nor bad; but he would not dispute that they are bad for the organism in which they happen. Still the Stoics had got the root of the matter in seeing that it was absurd to complain of the universe for giving one a toothache. Man has no rights against the universe—and owes it no duties. It may be objected that Stoicism even with nature-worship is hard enough, but Stoicism without nature-worship would be intolerable. This however is to mix up philosophy and poetry. No doubt it is undesirable to think and speak scientifically at all times, just as society would become impossible if every man always stood on his strict rights. The popular and poetic language which admires, exalts, or even adores the order of nature is fit and laudable in its place. But the prosaic reason of the facts behind it is that, being born into an order of things we did not make and cannot unmake, we have to conform to it at our peril; which being so, the only rational thing to do (as M. Renan somewhere says) is to make the best of the necessity and be wise with a good grace. And on this ground there is no fear that the poets and prophets will ever cease to be welcome.

It is not in the cosmical but in the social order that we must look for the full harmony of reason and feeling, the reconciliation of science and poetry. In the common weal of our fellow-

men, and in that alone, can we find a true and sufficient law of life, proposing an unlimited field of labour for the reason, and an unlimited scope for the best affections of our nature. Impelled by the sympathies laid up within us by the thoughts and deeds of the past, and guided by the ever ripening wisdom delivered from generation to generation, it is for man to seek his inheritance in fulfilling that law, and therewith to be content. If any think they are assured of something more, we grudge them not their hopes. But let them not force their promises upon us, nor forbid men to love one another without first loving some inscrutable ideal. Let them not disparage the plain grounds and sanctions of human morality to exalt the virtues of their supernatural remedies for our ills. Righteousness and goodwill among men are too precious to be the monopoly of any sect or persuasion; they will not be tied down to an assent, real or nominal, to speculative propositions. Speculation is doubtful and divided; experience, continuous, certain and fruitful. Morality, being founded on experience, can be in no real danger from speculation. To cry down speculation in the interest of morality is the act, if sincere, of a shallow and fickle mind to which the foundations of morals are but casual and arbitrary ordinances. If insincere, I know of only one name by which honest men may call it.

FREDERICK POLLOCK.

NOTE.—A very brief indication of modern authorities on Spinoza (besides those already cited in the course of the foregoing paper) may perhaps be useful.

The biography prefixed to the last edition of Auerbach's translation of Spinoza's works (Stuttgart, 1871), together with the preface, contains either explicitly or by reference almost everything necessary to be known. The translation itself is scrupulously exact, and may be consulted with great advantage. The version of the recently discovered works is by Professor Schaarschmidt, of Bonn, and as to the *Tractatulus de Deo et Homine* probably represents a better recension of the original text than has yet been published.

Dr. A. Van der Linde's *Benedictus Spinoza: Bibliografie* (The Hague, 1871) gives a classified catalogue, as exhaustive as human industry can make it, of everything published of and concerning Spinoza down to the date. (The same author's earlier book on Spinoza, Göttingen 1862, contains the curious and formerly little known history of the Spinozistic heresies which sprang up in the Reformed Church of Holland in the 18th century.)

The second edition of Dr. J. van Vloten's book (*Baruch d'Espinoza zijn leven en schriften*; in 2d ed. the title is changed to *Benedictus de Sp. naar leven en werken*) appeared in the same year. There is unfortunately no translation of it. It is the best if not the only comprehensive account of Spinoza's life and philosophy yet produced in a literary and untechnical form. Dr. Van Vloten's chief weakness, in my opinion, is one which he has in common with Dr. Löwenhardt, whose book has already been mentioned. He tries now and then to be more Spinozist than Spinoza himself, or rather to make Spinoza so.

Dr. Hugo Ginsberg has brought out a new edition of the *Ethics* and *Letters* with useful prolegomena (Leipzig, 1875-6 : see Mr. A. B. Lee's notice in MIND, No. VI., p. 273).

A recent and very full monograph on the philosophy is Theodor Camerer's *Die Lehre Spinoza's*, Stuttgart, 1877. I have been able as yet to make only a slight examination of this. The criticism is minute and ingenious ; so minute that a reader not already familiar with Spinoza would be in some danger of not seeing the wood for the trees, and so ingenious as rather to exceed the bounds of profitable discussion. Herr Camerer seems to have a predilection for difficulties, and to choose the more involved and troublesome view of Spinoza's meaning wherever there is any choice. In at least one place (*Eth.* ii. prop. 21) he forces upon Spinoza, in my opinion, a difficulty which Spinoza was especially careful to avoid. As to the general interpretation of the system he seems to stand at the opposite extreme to Dr. Van Vloten.

The bicentenary commemoration at the Hague has given rise to a good deal of occasional and controversial literature, much of it bearing only remotely on Spinoza and his doctrines. One ultramontane journal devoted several articles to violent abuse not only of M. Renan—to whom it denied even the merit of a commonplace sophist—but of his style, which it discovered, much to its own satisfaction, to be "flasque et énervé". Dr. H. J. Betz's little book (*Levensschets van Baruch de Spinoza, met een kort overzicht van zijn stelsel,*" The Hague, 1876) may be mentioned as of permanent value.

IV.—THE ORIGIN AND MEANING OF GEOMETRICAL AXIOMS. (II.)

MY article on 'The Origin and Meaning of Geometrical Axioms' in MIND No. III. was critically examined by Professor Land in No. V., and I will now try to answer his objections. We differ substantially on two points. I am of opinion that the recent mathematical investigations—or, as they have been called, "metamathematical investigations"* — as to wider kinds of geometry, have established the following propositions :—

(1) Kant's proof of the *a priori* origin of geometrical axioms, based on the assumption that no other space-relations can be mentally represented, is insufficient, the assumption being at variance with fact.

(2) If, in spite of the defective proof, it is still assumed hypothetically that the axioms are really given *a priori* as laws of our space-intuitions, two kinds of equivalence of space-magnitudes must be distinguished : *(a) Subjective equality* given by the hypothetical transcendental intuition ; *(b) Objective equiva-*

* The name has been given by opponents in irony, as suggesting "metaphysic" ; but as the founders of "Non-Euclidian Geometry" have never maintained its objective truth, they can very well accept the name.

lence of the real substrata of space-relations, proved by the equality of physical states or actions, existing or going on in what appear to us as congruent parts of space. The coincidence of the second with the first could be proved only by experience; and as the second would alone concern us in our scientific or practical dealings with the objective world, the first, in case of discrepancy, must be discounted as a *false show.*

For the rest, it is a misunderstanding on Prof. Land's part if he thinks I wished to raise any objection to the notion of space as being for us an *a priori* and necessary, or (in Kant's sense) transcendental, form of intuition. I had no such intention. It is true, my view of the relations between this transcendental form and reality, as I shall set it forth in the third section of this paper, does not quite coincide with that of many followers of Kant and Schopenhauer. But space may very well be a form of intuition in the Kantian sense, and yet not necessarily involve the axioms. To cite a parallel instance, it undoubtedly lies in the organisation of our optical apparatus that everything we see can be seen only as a spacial distribution of colours. This is the innate form of our visual perceptions. But it is not in the least thereby predetermined how the colours we see shall co-exist in space and follow each other in time. And just so, in my view, the representation of all external objects in space-relations may be the only possible form in which we can represent the simultaneous existence of a number of discrete objects, though there is no necessity that a particular space-perception should co-exist with or follow upon certain others; *e.g.*, that every rectilineal equilateral triangle should have angles of 60°, whatever the length of the sides. By Kant, indeed, the proof that space is an *a priori* form is based essentially on the position that the axioms are synthetic propositions *a priori.* But even if this assertion with the dependent inference is dropt, the space-representation might still be the necessary *a priori* form in which every co-extended manifold is perceived. This is not surrendering any essential feature of the Kantian system. On the contrary, the system becomes more consistent and intelligible, if the proof of the possibility of metaphysic derived from the evidence of geometrical axioms is seen to break down. Kant himself, as is well known, limited the scope of metaphysical science to the geometrical and physical axioms. But the physical axioms are either of doubtful validity, or they are mere consequences of the principle of causality, that is to say, of our intellectual impulse to view everything that happens as conforming to law and thus as conceivable. And as Kant's *Kritik* is otherwise hostile to all metaphysical reasoning, his system seems to be freed from inconsistency,

and a clearer notion of the nature of intuition is obtained, if the *a priori* origin of the axioms is abandoned, and geometry is regarded as the first and most perfect of the natural sciences.

I pass accordingly to the proof of the two theses enunciated above.

I.

Kant's proof of the *a priori* origin of the geometrical axioms is based on the assertion that it is impossible to form a mental representation of space-relations at variance with Euclid's geometry. But the "metamathematical" investigations passed under review in my former paper have shown that it is quite possible to devise and consistently work out systems of geometry that differ from Euclid's both in the number of space-dimensions and in their axioms, with their related systems of mechanics. I myself have tried to show what would be the sensible appearance of objects in spherical or in pseudospherical space. The mathematical correctness of those geometrical deductions (carried out for the most part analytically) is, as far as I can see, beyond question, and the like may be said as to the perfect validity of the corresponding systems of mechanics, which afford the same degree of free mobility for solid bodies, and the same independence of mechanical and physical processes on mere position, that are presupposed in the Euclidian geometry. Nor is there the least difficulty or uncertainty as to the nature of the space-perceptions that human beings would have in such other circumstances. In particular, Beltrami's discovery of the way of representing pseudospherical space in a sphere of Euclidian space shows directly what would be the appearance of optical images in pseudospherical or spherical space. Every optical image of objects at rest as seen by a spectator at rest would, in fact, be exactly the same as that of the corresponding representation in Beltrami's sphere as seen from the centre (supposing always that the distance of the two eyes may be neglected in comparison with the imaginary radius-of-curvature of the space). There would be a difference only in the order of succession of the images, according as the observer or the solid objects moved. Nothing would be changed but the rule for inferring what images would succeed others in case of movement. And, as I have maintained, such differences are not necessarily considerable, nor need they excite attention. Men lived for a long time on what they thought was the flat earth, before they discovered its spherical form, and they struggled long enough against this truth, just as our Kantians at the present day will not listen to the possibility of representing pseudospherical space. The discrepancies in pseudospherical space would be of

a somewhat similar kind, and not necessarily more striking (if the measure-of-curvature tallied) than are those betrayed by the spherical surface of the earth to an observer whose movements are limited to a few miles.

In discussing the question whether space-relations can be imagined in metamathematical spaces, the first thing to settle is the rule by which we shall judge of the imaginability of an object that we have never actually seen.

I advanced a definition which was to the effect—that for this we need the power of fully representing the sense-impressions which the object would excite in us according to the known laws of our sense-organs under all conceivable conditions of observation, and by which it would be distinguished from other similar objects. I am of opinion that this definition contains stricter and more definite requirements for the possibility of imagination than any previous one, and, as far as I can see, Prof. Land does not contend that these requirements cannot be satisfied for objects in spherical or pseudospherical spaces. At the same time, the representation of objects that we have often perceived, or that resemble such in whole or in parts, will necessarily be superior in one respect to the representation of objects of which this cannot be said, namely, in the swiftness and ease with which we can imagine beforehand the various aspects of the objects under different conditions of observation, or run them over in memory. This ease and swiftness in the imagination of an object never actually seen, will be wanting just in proportion as the observer has more rarely perceived and less carefully apprehended anything like it. Now we have absolutely never had before us constructions of three dimensions in spherical or pseudospherical space. The geometer, however, who has trained himself in the power of representing surfaces that can be bent without stretching and without change of their measure-of-curvature, as also the figures that can be drawn upon them, finds relations in these that are closely analogous to the relations in those other spaces. The physiologist too who has studied the combinations of sense-impressions under every possible variety of conditions, such as never occur in daily experience, is more practised in representing unusual (but yet strictly determinate) series of sense-impressions than one who has never had the same training. I may perhaps be pardoned, then, if I do not see why the fact that I come "fresh from the physiology of the senses" to epistemological inquiries should be a positive bar to my dealing with such questions as the one before us.

Since, then, the metamathematical space-relations have never been actually perceived by us, we are not to expect to have that power of swift and easy representation of the varying aspects of

objects in them that can come only from daily experience and practice. The utmost we can expect is to arrive by slow steps and careful reflection at a full and consistent representation of the corresponding series of sense-impressions. But in point of fact, we strike upon as great and similar difficulties of representation when we seek to figure to ourselves the course of a greatly knotted thread, or a many-sided crystal model, or a complex building that we have never seen, although the possibility of figuring all these is proved by the fact of actual perception.

Unfortunately, Professor Land does not say whether he has any objection to my definition of imaginative representation, nor does he himself offer any other, though he several times hints that he means something different by "imaginability". Thus, at p. 41, he says: "We do not find that they [the non-Euclidians] succeed in this [making metamathematical spaces imaginable], unless the notion of imaginability be stretched far beyond what Kantians and others understand by the word." At the same place, he asserts that only that which can be connectedly constructed in our space can be regarded as "imagined". He adds at p. 45: "Non-Euclidians try to make imaginable that which is not so in the sense required for argumentation in this case". If by "argumentation" is here meant the discussion of the question whether our conviction of the actual validity of Euclid's axioms in our objective world justifies a conclusion as to their *a priori* origin, I am of opinion that my definition of imaginability is the only one that can decide the question. If we should define thus: "Nothing is to be held as imaginable in space, of which we cannot actually construct a model with existing bodies,"—all discussion of the question in dispute is, no doubt, cut short; but then this imaginability, ascribed by the definition to Euclid's space alone, affords not the least ground for deciding whether its origin is to be sought in a law of the objective world, or in the constitution of our minds. Accordingly, I do not believe that Professor Land means to postulate this, though his words bear the interpretation. I can only suppose him to object to my definition of "imaginability" that it does not include a reference to the apparently spontaneous readiness with which the various aspects of any common object are represented when we have sensible experience of some one of them. But we know that such an association of different impressions can be acquired and strengthened by frequent repetition; as, notably, between the sound of a word and its meaning. I therefore do not see that we have the right to consider this readiness of suggestion as essential to imaginability. The fact, moreover, that Lobatchewsky, in the way of pure synthesis, that is to say, by means of actual geometrical constructions,

worked out a complete system of pseudospherical geometry, agreeing exactly with the results of analytical inquiry, shows that such a geometry can be grasped in all its details by the imagination.

As regards the use of analytical methods in metamathematical inquiries, this is justified by the circumstance that we have here to do with the representation of an object that has never been perceived—an object whose notion, or (so to speak) architectural plan, has first to be developed, to be shown inherently consistent, and to be elaborated so far in detail as that for every particular case it is made clear what the corresponding sensible suppression would be in the circumstances. Now, this ideal development of the ground-plan is best attained by the methods of analytical geometry, securing as these do most effectively universality and completeness of demonstration. No doubt a manipulation of notions by means of the calculus does not suffice to prove the existence of the object so treated, but the process is sufficient to the extent of proving the possibility of a consistent series of sensible pictures; whence it follows that the space-relations actually perceived in a real world by organs analogous to our own might correspond with a geometry different from Euclid's.

Since then the relations obtaining in metamathematical spaces of three dimensions satisfy the conditions of imaginability required by my definition—and more cannot be demanded in the case of objects never actually perceived—Kant's proof of the transcendental character of the axioms and their *a priori* origin must be pronounced insufficient.

II.

In this second section I will start from the position that Kant's hypothesis of the transcendental origin of the geometrical axioms may be correct though not proved, and will consider of what value this immediate knowledge of the axioms would be in judging of relations in the objective world. I will also, in the first instance, adhere to the realistic hypothesis and speak its language, assuming that our sensible impressions are caused by things really existing in space and acting upon our senses. My object in so doing is merely to take advantage of the simple and intelligible speech of common life and of physical science. I regard this view of things, however, expressly as hypothetical, and I mean afterwards to drop the realistic hypothesis in my third section, when I will repeat my exposition in abstract language, without any assumption as to the nature of real existence.

First of all, we must distinguish between equality or congruence of space-magnitudes as dependent on the assumption of transcendental intuition, and their equivalence as determined by measurement with physical instruments.

I call *physically equivalent* those space-magnitudes in which under like conditions and within like periods of time like physical processes take place. The process most commonly employed, with due precautions, for the determination of physically equivalent space-magnitudes is the transference of solid bodies from one to the other, that is to say, measurement with compass and rule. Otherwise, experience teaches us generally that all space-magnitudes that have been proved equal by a sufficiently exact method of physical measurement, manifest equivalence under every other kind of physical treatment. Physical equivalence of two space-magnitudes is thus a perfectly definite objective attribute of the two, and clearly there is nothing to hinder us from investigating experientially how physical equivalence of one pair of magnitudes is dependent on physical equivalence of other pairs. This would yield a kind of geometry which, in distinction from the geometry founded on the supposed transcendental intuition of space, I will for the time being call *physical geometry*. This in its procedure would have all the character of a physical science.

As soon as we have found the proper physical means for determining whether the distances of any two pairs of points are equal, we shall also be able to distinguish the case where three points, a, b, c, lie in a straight line, because then there will exist no point distinct from b having the same distances as ab and bc from a and c.

We should then be able to seek three points, A, B, C, equidistant from one another as angles of an equilateral triangle, and upon the rectilineal sides, AB and AC, two other points, b and c, equidistant from A. Upon this the question would arise whether the distance $bc = Ab = Ac$. Euclidian geometry answers, yes. *Spherical* geometry would say that $bc > Ab$, when $Ab < AB$; *pseudospherical* geometry would say the opposite. Here then, at our first steps, we should find we had to settle our axioms.

I have chosen this example because the question is only about equality or inequality of distance between pairs of points or, in the case of the three points in one line, about the determinateness or indeterminateness of their position, and no complex construction has to be imagined. That the supposed transcendental knowledge of axioms cannot be brought to a decision in this case, because it involves the behaviour of physical bodies, is granted by my opponent.

But my opponent is of opinion that besides this *physical*

geometry which takes account of the physical (as well as the geometrical) properties of bodies, there is also a *pure geometry* grounded solely on transcendental intuition—that we have, apart from experience, a representation of geometrical bodies, surfaces, lines, that are absolutely rigid and immovable, and yet may stand in the relation of equality and congruence. I add that we are bound to claim absolute exactness for this transcendental representation of straight lines, equal distances or equal angles; otherwise, we could not say whether two straight lines prolonged to infinity will intersect once only or twice, or whether every straight line that cuts one of two parallels must also cut the other lying in the same plane. Now, supposing we had satisfied ourselves, on stronger grounds than have ever yet been adduced, that we do possess intuitions of this kind, we should in fact be in a position to work out a transcendental geometry, and then insure its physical applicability to the space-relations of physical bodies, provided it could be determined that the magnitudes which appear to us as equal in transcendental intuition are also to be recognised as physically equal. It is evident, however, that this question cannot be decided by pure space-intuition. Perhaps then by experience? But how? When we rely directly on our sense-perceptions, we are very clumsy in our comparison of lengths or in estimating faint curvatures of line, and since our ability in both kinds of appreciation increases with practice, it is probable that to a great extent, if not wholly, it has been acquired by previous training and by the use of physical means. The retina, in fact, or the hand, is like a compass that we carry about with us.

There would still remain the application of geometrical reasoning, based upon the axioms, whereby we might infer the equality of two lengths or angles not directly measured. But to be able to apply the transcendental axioms we must already have established the equality of a number of lengths or the straightness of a number of lines, which could be done again only with the help of physical instruments; and we must thus, in reasoning from the physical equality of some magnitudes to the abstract geometrical equality of others, employ the very proposition we wish to prove.

Supposing physical geometry had discovered as laws of nature a number of universal propositions exactly corresponding with the transcendental axioms, the most that could be maintained respecting the assertion that space-magnitudes equal to one another in transcendental intuition are also physically equivalent, would be that it was an hypothesis that led to no contradiction. But this would not be the only hypothesis that could be made. The correspondence would also hold if (as I showed in

my previous article) physical space were taken as the image of transcendental space in a convex mirror.

That physical geometry and the supposed transcendental geometry need not be in correspondence, is clear from the fact that we can represent them as not corresponding. The way to make apparent the incongruence is implied in my former exposition. Let us suppose physical measurements in correspondence with a pseudospherical space. The sensible appearance of such a space, observer and objects both being at rest, would be the same as if we had before us in Euclidian space Beltrami's spherical model with the observer at the centre. But with every change of the observer's position, the centre of the projection-sphere would necessarily keep pace, and the whole projection would be dislodged. An observer, therefore, whose space-perceptions and judgments of magnitudes either depended on transcendental intuition or were the result of past experience in the sense of Euclidian geometry, would have the impression, as he moved, of seeing all objects changing position in a determinate way, and expanding or contracting differently according to the difference of direction. In like manner, though the quantitative relations are different, we see even in our actual world the apparent relative position and size of objects vary with the difference of distance as we move. Now, as a matter of fact, we are able to judge from the varying visual pictures that the objects about us do not change their relative position and size, so long as the perspective transpositions correspond exactly with the law we have found to hold in all previous experience for objects at rest; we are able also, on the other hand, to infer a motion of the objects whenever there is a departure from this law. And just so, I, who accept the experiential theory of perception, believe that any one who could pass from Euclidian into pseudospherical space would at first indeed think he saw apparent movements, but very soon would learn to accommodate his judgment of space-relations to the new conditions.

I am quite aware, however, that this assumption is one that is formed by mere analogy from what we otherwise know of sense-perception, and cannot be experimentally proved. So let us suppose that the judgment of space-relations could not possibly become modified in such an observer, from the fact of its being connected with native forms of space-intuition. Nevertheless he would quickly discover that the motions he believed he saw were only apparent motions, because they would always be reversed when he returned to his first position; or a second observer would be able to declare that every thing remained at rest while the other changed his place. Thus scientific inquiry at all events, if not immediate

perception, would quickly determine what were the physically-constant space-relations, just as by scientific investigation we know that the sun stands still and the earth revolves, although the sensible appearance of the earth standing still and the sun going round in twenty-four hours remains.

What I have said up to this point would, if I rightly understand him, be assented to by Prof. Land, for he himself, following out the example of 'Dr. Mises,' adduces a case of a similar sort. But then it will follow that the supposed transcendental intuition *a priori* becomes reduced to an *objectively false show*, from which we have to free ourselves and which we must try to forget, as in the case of the apparent movement of the sun. There would then be an insuperable contradiction between spacial equivalence as it appears to the native intuition and that which is manifested in objective phenomena. Our whole scientific and practical interest would be centred in the latter. The transcendental form of intuition would exhibit physically-equivalent space-relations only in the way that a map exhibits the surface of the earth—small pieces and strips correctly, larger pieces of necessity falsely. There would not then be a question only as to *manner of representation*, which necessarily implies some modification of the subject represented, but the relations between the appearance and the reality would be such that, while there was agreement within certain narrow limits, the representation would be *false* on a larger scale. In Prof. Land's example of dwellers on a spherical surface, he escapes this conclusion by falling back on Euclidian space of three dimensions. But in the case of pseudospherical space of three dimensions, if we wish to figure limited portions of it in a non-curved space, we must betake ourselves to a non-curved space of four dimensions, and must in any case one way or the other transgress the geometry of Euclid.

From these considerations my conclusion is as follows:—If we really had an innate and indestructible form of space-intuition involving the axioms with it, their objective scientific application to the phenomenal world would be justified only in so far as observation and experiment made it manifest that physical geometry, grounded in experience, could establish universal propositions agreeing with the axioms. And this condition coincides with Riemann's postulate, that the measure-of-curvature of our space must be determined empirically, by measurement. All measurements as yet have shown no deviation from zero in the value of this measure-of-curvature. We can therefore regard the Euclidian geometry as objectively valid within the limits of our present powers of exact measurement.

III.

The discussion in the second section has been confined to the objective sphere, and conducted from the realistic point of view of natural science, whose aim is to comprehend or grasp conceptually the laws of nature. Towards this end perceptive knowledge is either only a mere help or, as the case may be, a false show to be got rid of.

Now Professor Land thinks that in my exposition I confused the notions of "objectivity" and "reality"; that when I asserted that geometrical propositions could be tested and verified by experience, I assumed without foundation "that empirical knowledge is acquired by simple importation or by counterfeit, and not by peculiar operations of the mind solicited by varied impulses from an unknown reality" (MIND V., p. 46). If Professor Land had been acquainted with my different writings upon the Theory of the Senses, he would have known that I myself have always been combating the very assumption he would ascribe to me. I did not refer in my article to the difference between "objective" and "real,"* because it seemed to me to be of no importance for the investigation in hand. To justify this opinion of mine, let us now drop out of sight the hypothetical element in the realistic view and show that there still is a perfectly sound meaning in seeking for a physical equivalence of space-magnitudes, and in deciding by experience as to the truth of propositions that correspond in import with the axioms.

The only assumption we still maintain is that of the law of causation, to the effect, namely, that all mental states having the character of perception that come to pass in us do come to pass according to fixed laws, so that when different perceptions supervene we are justified in inferring therefrom a difference of the real conditions determining them. As regards these conditions—the reality proper that underlies the phenomena—we know nothing: all opinions we may entertain on the subject are to be regarded only as more or less probable hypotheses. But the assumption is the fundamental law of our thinking: if we surrender it, we abandon the very notion of comprehending things at all. I lay stress, then, upon the fact that no assumptions are made here as to the nature of the conditions under which the mental presentations arise. The hypothesis of subjective idealism is equally admissible with the realistic view, the language of which we have been employing.

* The German word used by me, and translated "real" in the English, was "*wirklich*", *i.e.*, "that which works or acts". "*Wirklich*" has not the implication of "independent existence" that "real" has.

We might assume that all our perceiving is but a dream, only a thoroughly coherent dream, in which presentation after presentation is evolved according to strict laws. In this case, the reason of the appearance of any new mental state having the character of perception would have to be sought in the fact that certain other perceptions, joined perhaps with a consciousness of certain voluntary impulses, had gone before in the dreamer's mind. What we call laws of nature on the realistic hypothesis would on the idealistic be laws governing the succession of mental states having the character of perception. And here, with reference to the question treated above in my first section, I will farther observe that in dreams we fancy ourselves perceiving as well as thinking; that is to say, some of our states arise with the constraining character of perception, others without this as a free play of representation (so far as in the waking state this may be called free). The question, therefore, whether by giving rein to the imagination we might call forth such a series of representations as would correspond, in perception, to a pseudospherical space, retains its full meaning on the idealistic hypothesis.

Now we find, as a fact of consciousness, that we think we perceive objects occupying determinate positions in space. If an object appears thus in one particular part of space and not in another, this must depend on the kind of real conditions that evoke the presentation. We must conclude that other real conditions might have existed fitted to produce a perception of the like objects in a different position. In the world of reality there must be some causes or aggregates of causes determining at what particular place in space an object shall appear to us. These I will designate, for shortness, *topogenous moments, i.e.*, circumstances determining space-perception. We know nothing of their nature; we know only that the occurrence of spacially different perceptions involves a difference of topogenous moments. Also there must be different causes in the sphere of the real, when at the same place we think we perceive substances with different qualities. I will call these *hylogenous moments, i.e.*, circumstances determining the perception of material things. New names are chosen in both cases, to avoid the misleading associations of current expressions.

If now we perceive and affirm anything that involves space-relations, the real meaning of our words no doubt is nothing more than that between certain topogenous moments, the nature of which is unknown to us, a certain relation holds, whose nature also is unknown. Hence Schopenhauer and many followers of Kant have been led to the improper conclusion that there is no real content at all in our space-perceptions, that space and its relations are purely

transcendental and have nothing corresponding to them in the sphere of the real. We are, however, justified in taking our space-perceptions as *signs* of certain otherwise unknown relations in the world of reality, though we may not assume any sort of similarity between the sign and what is signified. But if only so much stands fast—that to unlike signs there correspond unlike objects and to like signs there correspond objects that are like in a certain relation or complex of relations, although we may not be able to define it at the time—this will suffice to yield us a real content. The same holds for space-perceptions as for qualities of sensation. Blue and red are qualities of sensation only; nevertheless we are justified in maintaining that a blue surface is physically different from a red surface. When we observe that the most diverse physical processes may go on during equal periods of time in similar fashion at different, but congruent, parts of space, the real meaning of such a perception is, that there may be in the sphere of reality equal sequences and aggregates of hylogenous moments combining with certain distinct groups of topogenous moments, which latter we then call *physically-equivalent.* We may thus discover by observation what special figures appearing in our perception correspond with physically-equivalent topogenous moments; and experience tells us that they are equivalent for all physical processes.

Now in the case of the equilateral triangle, above, the question is only about (1) equality or inequality of distances, *i.e.*, physical equivalence or non-equivalence of the systems of topogenous moments corresponding with these, and (2) determinateness or indeterminateness of the position of a point, *i.e.*, of its topogenous moments. These notions of determinateness and equivalence in relation to particular sequences we can, however, apply also to objects of unknown character. And I thence infer that the science which I have called *physical geometry* consists of propositions of real content and that its axioms are determined by relations that hold in the sphere of the real.

Nevertheless, a geometry based on transcendental intuition is conceivable also. We have only to assume that, without physical measurement, the intuition of the equality of two space-magnitudes is developed immediately by the manner of action of the topogenous moments upon our consciousness, and that the magnitude of the apparent distance of every pair of points depends by the same formula on any three functions of the topogenous moments of each of the points, as the distance in Euclidian space (according to the Pythagorean proposition) depends on the three right-angled co-ordinates of each point. If such a law were given immediately for the perceived distance, our intuitions of space would necessarily satisfy the axioms of

Euclid, however the topogenous moments of the separate points might be in the sphere of the real; for the whole of Euclid's geometry may be developed from that formula for the distance of two points. But then the question would arise whether the equality of the perceived distance and the physical equivalence of the distance depend on the same function of the topogenous moments or not. That is a question that goes beyond the province of space-intuition, and can be decided only by physical investigation. If there is agreement, the fact would have to be signalised as a law of nature, or, as I called it in my former paper, a pre-established harmony between intuition and the real world.

Thus I think I have sufficiently proved that the propositions put forward by me in that paper rest upon no confusion of the "objective" and the "real". By way of conclusion I will bring my results once more together:—

(1) There exists in any case the science that I have called *physical geometry*, and its general propositions are products of experience.

(2) The assumption of a knowledge of axioms by transcendental intuition apart from all experience is *(a)* an *unproved* hypothesis, and *(b)* an *unnecessary* hypothesis, since it explains nothing in our actual knowledge of the outer world that cannot equally be explained without its help: also, as regards our objective knowledge, *(c)* a wholly *irrelevant* hypothesis, since the propositions it includes can be applied to the relations of the objective world only after their objective validity has first been independently proved.

The presumed transcendental knowledge of axioms can thus have at the most an educational value, as helping to a first notion of space-relations.

H. HELMHOLTZ.

V.—PHILOSOPHY IN EDUCATION.

I.

How is Philosophy to be taught? and what is its educational value? are questions which by their form suggest answers similar to those given to like inquiries regarding the Classics, Modern Languages, Natural Science, and History. Accordingly we find our modern compendiums of Philosophy for beginners treating Philosophy as a system of facts to be learned, and apparently assuming that these facts have an educational value similar in kind to that of historical or scientific facts. And here the modern compendium merely develops in greater

detail a point of view which seems previously to have recommended itself to the experience of the philosophical world. The lectures of professors of Philosophy have always been attended by the majority of students in the same spirit as those of the professors of other subjects. In finding an answer to so practical a question as How is Philosophy to be taught? we must not neglect a consensus of such generality as this; we must be prepared to find that to some extent at least Philosophy can be taught in the same way, and with the same results as a language or a science. But, while attaching due weight to this general recognition of the Teacher of Philosophy, we must not allow ourselves to be carried away by the methodical form of the modern compendiums. Their form has evidently been consciously borrowed from the sciences, and must not be taken as evidence for more than that certain individuals think that Philosophy can be taught like one of the sciences.

There is, however, another point of view which is supported by much experience in the philosophical world. According to it Philosophy is not like a period of history or a language in which progress is measured by increase in the amount of intellectual associations. It rather resembles good health which is constitutional; or at least good taste, which is imperceptibly acquired by habituation. It partakes more of the nature of character than of knowledge. This view has its finest expression in Plato's identification of Philosophy with διαλεκτική and ἔρως—earnest conversation between sympathetic friends. A man does not know what he really thinks and feels till he converses earnestly with his friend. What he really thinks and feels at such a time, not what he gets passively from a book, is his philosophy. But this conversation is possible only to men who have lived long and virtuously in a well-ordered state, and who have been successful students of the sciences, and have gained experience of human nature. Hence Philosophy cannot be taught to youths like geometry, for youths have no experience of life, and Philosophy is a sort of esoteric experience of life, which at last enables a man to play an individual part in the serious conversations of his friends. A man's philosophy dies with him; for it is his knowledge of himself, his peculiar way of testing what he hears by reference to his own experience; it is the easy movement of his cultivated faculties stimulated by the presence of his friend. Aristotle too seems to hold that Philosophy is not a system of knowledge, but a spirit developed in cultivated society, by which a man knows himself and achieves his own freedom. In the life of pleasure a man makes himself a means to the gratification of his desires; in the life of ambition, a means to social success. If the sources of pleasure

or the objects of ambition be withdrawn, such a man is helpless. But the *βίος θεωρητικός* is self-sufficing. In it a man makes his own true self the object of his thought and desire. And yet goodness and good sense are the necessary foundations of this life. Aristotle goes as far as to say that *πολιτική* is the art or science of the *Summum Bonum*. Although on his principles this statement cannot be taken strictly—there being no art of such a divine function as *νόησις νοήσεως*—yet it is highly significant that *θεωρία* is viewed as impossible for man except in society. *Θεωρία* like *διαλεκτική* is the highest result of the experience of a long and brilliant life. The nexus of Aristotle's system is missed, I think, by those who lay stress upon his occasional comparisons of the human *θεωρητικός* with the Divine Being. The *θεωρητικός* is not a solitary thinker who is engaged in working out a system of philosophy for himself. He stands in the closest *philosophical* relations to his city and his friends. He is the man of culture who engages in politics without making them his trade or his amusement. His political action has not a self-regarding end—*ἡδονή* or *τιμή*, but an ideal end—*εὐδαιμονία* in which many participate in a brilliant city. In war such a man is *ἀνδρεῖος*. He meets danger *διὰ τὸ καλόν*—to preserve and illustrate the brilliant everyday life of his city; not to avoid personal disgrace or obtain personal honour. He is a patriot and no mere duellist. *Φιλία* is the bond which unites such men. It is in converse with his friend that a man learns to know himself.

Philosophy then according to Plato and Aristotle would seem to be a mental and moral attitude, the result of long experience rather than any definite body of doctrine which might be directly taught like a language or a science. But perhaps all this is too vague at the present day, and requires for its appreciation actual experience of the conditions of the old Greek political life. The experience of the present seems to favour another view, for we have Professors of Philosophy, who teach in much the same way as professors of other subjects. They teach Formal and Material Logic, Psychology, Ontology, Ethics, and the History of Philosophy. Can these subjects be taught profitably or at all to youths? and if so, how? Does the study of these subjects by youths add to their knowledge of facts, or strengthen their minds as instruments? Does it correct any mental or moral bias likely to be contracted from the exclusive study of objective facts? Does it under any circumstances lend itself to superstition? If, under these heads, we find the various philosophical subjects, as studied by youths, unsatisfactory, we shall be obliged to return to the view which we have just left—that Philosophy is not learned like a language or a science; to see

if after all we cannot discover in it something applicable to modern no less than to ancient Greek life.

Let us begin with the History of Philosophy. The success which in recent times has attended the employment of the Historical Method in so many fields of inquiry has doubtless had much to do in making the History of Philosophy popular as an introduction to philosophical studies. But it perhaps does not follow, because one who traces the history of a word studies Philology, that one who reviews the history of an opinion, or rather has it reviewed for him, studies Philosophy. The fact indeed seems to be that the educational value of a course of the History of Philosophy is very small, because the pupil does not know what it is about. He is invited to study the development of opinions, before he knows what an opinion is in the philosophical sense. Aristotle's doctrine of the futility of teaching Moral Philosophy to youths who are yet ignorant of the moral ὅτι is applicable to Philosophy as a whole. The History of Philosophy presents the pupil with a phantasmagoria of views which he cannot help regarding as severally untrue and unreal. Thales, he is told, made Water his principle, and Parmenides the One; the Realists said that Universals are real things, and the Nominalists that they are words; Clarke's standard is the Fitness of Things, and Bentham's Utility. Views presented thus make no impression, but are merely learned by heart, like the names of chief cities and the rivers on which they stand in the old-fashioned geography books. Instead of beginning a boy with the map of the world before he knows what a map really stands for, we ought, it is now admitted, to begin him with a map of his own parish, and show him on it the road by which he walks to school. Now in Philosophy also, if it is to be of any educational value, we must begin the pupil with his own parish. We must appeal to his personal knowledge and interests. That the History of Philosophy owing to its wide range and necessarily sketchy nature cannot do this is, I think, evident. From beginning to end in most cases the youth remains in entire ignorance of what his teacher is talking about. And it is a mistake to suppose that if we make the exposition simpler the pupil will understand better. The simpler the History of Philosophy is made, the more abstract it becomes. If in the course of his History the teacher, from taste or for some other reason, loiters round about some particular philosopher, and gives the pupil a view of his concrete personality and circumstances, there is then some hope; the pupil may be able to exercise his dramatic faculty, and in his own little way, represent the philosopher in question. But as a rule he is hurried on from hieroglyphic to hieroglyphic without being put in pos-

session of the key to open their secret. If, as is sometimes the case, certain of the views thus presented to the beginner manage to make an impression on his mind, it is a false one. The beginner in Philosophy has not had the experience necessary to one who would deal successfully with such a complicated system as the growth of man's thought on the highest subjects. He can take in only the simple or abstract. But there are few subjects which can be presented in an abstract manner without being entirely changed and falsified. There are few subjects in which it is possible to neglect all but one or two aspects. Where we are concerned with the personality of a thinker—for this is what the History of Philosophy is really concerned with—we must be able to enter fully into that personality; his 'points of contact' with his predecessors and successors, of which we hear so much in histories of Philosophy, really affect his surface only; and to study him with special reference to his 'place' in the History of Philosophy, is consequently to take an abstract view of him. It is useful to abstract the phenomena of wealth from the other sociological phenomena from which they are never actually separated, and thus construct the abstract science of political economy; it is useful to abstract the space-occupying properties of bodies, and construct the science of geometry; but only because wealth and magnitude are properties which can be clearly perceived in the midst of others. An epitome of a philosopher's system drawn to exhibit his 'place in the History of Philosophy' is not a property which can be thus abstracted from his life and writings. These must be studied in the concrete. They are misrepresented by the epitome in a way that actual bodies are not misrepresented by geometry, or trade by political economy; and this is the practical reason against the epitome. And further, the general objections to an epitome of philosophical views acquire increased force when we consider that it is intended for the use of those whose tendency is to exaggerate its abstractness. A boy may be a mathematician, as the author of the sixth book of the *Ethics* remarks, but cannot be a philosopher, because the objects of mathematics are δι' ἀφαιρέσεως—abstract or simple, whereas the principles of philosophy or science, as of good sense, are gained by lengthened experience. Now the beginner will regard the views which are presented to him in a history of Philosophy as being much less complex in their relations than they really are—much less complex even than the compiler of the history intended to represent them; he will treat them as so many separate abstractions, clearly-cut shapes, from which, if he is ingenious, he will start to deduce necessary conclusions, as a geometer starts from his definitions. I have heard of a young Berkeleyan

who apprehended his author's theory of matter in such an abstract manner as to be able to prove from it the truth of the doctrine of transubstantiation. He will perhaps construct for himself a theory of the development of Philosophy—not a difficult task where the organisms arranged are abstractions framed at will; and he will thus probably give his mind a twist for life. He will have become prone to mere assertion, and careless of matter of fact. On these grounds then I think that to begin the teaching of Philosophy with a sketch of the History of Philosophy is a futile, when it is not a mischievous, procedure. The History of Philosophy is only for ripe students.

Another branch which beginners are often taught is Psychology or the Science of Mind. This, it may be urged, is good. If Philosophy has for its purpose to make us thoughtful, to rescue us from the tradition of phrases, and commonplace immersion in the mere manifold of sense-experience, then surely it is good to make the learner think from the first about the powers and limits of his own mind. This contention is more specious than sound, for it is made without reference to the way in which beginners inevitably look at their own minds, as at everything else—in an abstract way. They acquiesce in striking aspects. Where, as in geometry, a striking aspect is also an important property, and separable without distortion, youths are successful. But they are prone to separate aspects, where this cannot be done without falsification. In his primer of Psychology the beginner is probably told that the mind has the three powers of Thinking, Feeling, and Willing: he hears a great deal about Mental Association, Generalisation, and perhaps Judgment, Ratiocination, and the rest. These terms become to him the names of sharply defined entities; his text-book, if a modern one, of course warns him against the error of so regarding these terms; but his experience is not sufficient to enable him to profit by the warning. He continues to encumber his memory with a fantastical Ptolemaic-like system of the mind. How deep and lasting is the impression made by such early-formed systems of the mind is proved by the nature of the criticisms which make up all but the best philosophical polemics. These criticisms one and all fail in taking opponents too literally. Instead of seeing an intellectual or, it may be, an emotional point of view in an opponent's statement about conscience, or whatever it happens to be—instead of taking the statement in connexion with the man and his life and times, they see only an entity which has no business to be where it is in the system, and must be turned out. Like the Stoics ridiculed by Plutarch, such persons make the mind of man into a wooden horse or a zoological garden.

But, it may be said, we begin the pupil with a *concrete* Psychology—with Comparative Psychology and Physiological Psychology. Here he will be engaged from the very first in a real science. To this it may be answered, why not make him study chemistry, which is easier than the physiology of the brain and anthropology, if it is your object to make him study a science? But let that pass. The fact remains that comparative psychology and mental physiology are advocated for beginners. The following considerations have convinced me that their tendency is most unfortunate—that they lay the foundations of a low scientific *morale*, inspiring the neglect of stringent canons of truth. To be other than mischievous, scientific training must be exact. We cannot entertain as relevant the plea that mental facts are by nature vague, and that mental science consequently cannot be expected to come up to the exactness of the objective sciences. The same plea might with equal justice be urged by the spiritualist against the scientific man who demands that spiritualistic phenomena, so-called, shall submit to the same tests as physical phenomena. If Psychology is a science, it must realise the character of the other sciences. In the first place—it cannot claim to be considered an abstract science like political economy, and screen its inexactness and vagueness by the plea that its conclusions are *ex hypothesi* only approximately true. There is no real parallel between Psychology and Political Economy. The phenomena with which Psychology has to do are so inextricably blended together that there is no practical justification of the attempt to separate one set of them for treatment by itself *in vacuo*, as there is for the separate treatment of wealth to the neglect of the other sociological phenomena. By treating wealth separately, we arrive at valuable practical results. Rational Psychology—the spirit of which too often animates its professed opponents—has not been justified by results. It has not given us any nearly true description or laws of mind. The 'Laws of Mental Association,' as we have them in our books, seem to me to reproduce merely in a more specious form the abstractions of the Rational Psychology of the past. These latter abstractions, once created, were often left to stand by themselves for what they were worth. But the 'Laws of Mental Association' are systematically employed as principles of psychological explanation, and have thus become the sources of the multiplication of abstractions. They are too general, as they at present stand, to serve as principles in such a concrete inquiry as that regarding the precise nature and genesis of this or that mental state. Doubtless each particular mental state has its laws; but we do not know them. When Cuvier deduced the marsupial type from the examination of a fossil jawbone—a

deduction afterwards verified by the discovery of the entire skeleton—he was enabled to do so because he knew from previous observation the precise law connecting a *particularly-formed* jawbone, with a particular type of skeleton. It would not have availed him much to know generally that every jawbone implies an entire skeleton. But this seems to be the amount of knowledge deemed sufficient by the manipulators of the 'Laws of Mental Association'.

In the second place, Psychology does not realise the type of an experimental science. An experimental science has to do with objects which are so definite that there is no danger, with proper care, of mistaking one for another—with phenomena which recur exactly as they have before occurred. It demands exact measurements, giving results which may be expressed mathematically, and thenceforth constitute the principles of a deductive extension of the science. Take, for example, that branch of physics of which the spectroscope is the instrument. Here we have certain lines always recurring exactly as they have before occurred, which cannot be mistaken one for another, and the intervals of which can be measured. The identification of an absorption-line observed in the solar spectrum with a bright line caused by the flame of a known substance burnt in lamp depends for its success upon the definiteness of the phenomena, their constancy, and the possibility of exact measurements. The lines of iron, for example, are very numerous, and are distributed in complex groups over several parts of the spectrum; to detect iron in the sun implies that these lines in their arrangement and distances are constant, and that exact measurements are possible. Now let us ask regarding mental phenomena—Are they so definite that there is no danger, with proper care, of mistaking one for another? Do they recur exactly as they have before occurred, like the lines of iron in the spectrum? Or is memory, which in Psychology takes the place of natural recurrence, of such a character as never to present us with the same object a second time? There can be little doubt, I think, as to the answers to be given to these questions. Psychology is not a science after the type of spectroscopy.

But perhaps Psychology realises the conditions of a comparative science, like biology. What are these conditions? The objects must be so definite and constant that not only we shall not mistake them one for another, but that we shall be able to detect their minutest properties; for the classifications required by biology often depend on the detection of rudimentary organs of a very minute kind, and exhibit series of organisms and organs passing into one another by fine gradations. It is the definiteness of these objects and their constancy under minute

examination which render a science of biology possible. And moreover they are objects which repay the minutest examination, for they are 'Natural Kinds,' and their properties are inexhaustible. Had examination sufficiently minute to detect obscure rudimentary organs been impossible, biology could not have reached its now leading conception of development, founded as that conception is upon such discoveries as these—that the flowers and fruit of plants are modified leaves—that the wing-cases of beetles are transformed branchiæ. Now can Comparative Psychology satisfy the foregoing conditions? Are the mental states which it tries to classify and arrange serially in the order of development so definite as not to be mistaken one for another? Is their nature constant? Do they lend themselves to minute examination with a view to the detection of rudimentary organs so essential to a classificatory science such as Psychology professes to be? We fear that rudimentary organs are little known in Comparative Psychology—that it makes much greater use of what Mr. Darwin calls analogical or adaptive resemblances—that in short all its cetaceans are fishes. It is easy to see how precarious must be the thread which guides the comparative psychologist in tracing a mental state back to its origin. He can pass from one link to the next only on the strength of some resemblance—and what if the resemblance be merely 'analogical'? At some stage or other of his investigation, owing to the nebulous nature of his objects, he is morally certain to be thus drawn from the path; and even if he did keep to the path, his success could not be verified—could not be distinguished from failure. In one word, Psychology is not a comparative science because it cannot detect rudimentary organs, its objects not being 'Natural Kinds,' but phenomena which change and vanish under the attempt to examine them. This, I think, is what must be said of the scientific claims of Psychology. To begin philosophical instruction with it is mischievous. The crude admixture of psychology which finds a place in so many of our elementary books is of course indefensible as information offered to beginners. They know nothing of physiology from direct observation, and are simply demoralised by being made to commit its language to memory. They create for themselves a mythology of the nerves—as essentially metaphysical as the mythology of the faculties against which they are warned; they learn the too-easy lesson of accepting mere assertion for discovery, and the loose concatenation of ideas for progress in investigation. The proper time to study Psychology is not before, but after a man has become acquainted with the facts and methods of some one of the sciences properly so called, or at least has gained ordinary experience of the kind of evidence required by practical men of

culture for alleged facts and events. As it is, however, Mental Science (we shall speak of Logic afterwards) is the science with which the majority of educated men—those whose education has been literary and not properly scientific, or mathematical—are principally acquainted. They know nothing of chemistry, or physics, or biology, or other objective science, but they have read some mental science in early youth. It is the only type of a science which is present to their minds through life. Such persons cannot fail to have an erroneous conception of the nature of a science. Many of them accordingly pass easily on to ontological fields, in which all can be proved to the satisfaction of those who do not know what proof is, and who have never learned the first lesson of criticism—that the procedure of the natural sciences is merely a consistent illusion when employed in a region beyond the limits of possible experience.*

* In a rejoinder to a paper by the present writer in MIND, No. IV., M. Straszewski, writing in the *Revue Philosophique* for October 1877, seems to labour under a slight *ignoratio elenchi*. The present writer maintained in that paper that the objects (in the plural) of Psychology—meaning the various conscious states—are not definite enough, clearly and distinctly enough perceived, to admit of scientific treatment. But M. Straszewski's paper proceeds upon the assumption that the present writer asserted that the object (in the singular) of Psychology—meaning its γένος or sphere, consciousness—is not rounded-off. He accordingly is at pains to show that consciousness is *sui generis*, and—on the principle, I suppose, of μία ἐπιστήμη ἑνὸς γένους—that therefore Psychology is a science. But the proposition 'Every science has a separate field' cannot be thus converted simply. While allowing with M. Straszewski that the field of consciousness is separate from all others, and while admitting that *if* there were a science in this field it would be virtually an independent one, I hold that there is no science in this particular field, because the objects or phenomena contained in it are of a nebulous character. The tides *e.g.*, are sufficiently themselves to be treated by a distinct science, *if* we knew enough about them. In short, M. Straszewski transforms 'Every ἐπιστήμη has its γένος' into 'Every γένος has its ἐπιστήμη'. His article is a fine example of the prevalent malady of supposing that the words of science have a charm to bring form out of any matter. Because the methods of the objective sciences are so successful, we are told that we must also apply them in the explanation of Mind. This mere recommendation, expanded at length, is the real foundation of the opinion that Psychology is a science ; for Comparative Psychology after all never gets farther than *prolegomena* to the effect that the methods of the organic sciences have effected marvels, and that accordingly we must compare mental states in the various stages of their development, that we must deduce results from the Laws of Mental Association, and then verify them by observation, and so on with the whole vocabulary of the comparative sciences. But this Science of Mind terminates with these *prolegomena*, which might equally well serve as *prolegomena* to any other comparative science. The few illustrations given of the development of conscious states *as such* cannot serve as evidences of the existence of a *science* of them, because conscious states as such are not minutely known and definite organisms which can be serially classified and whose rudimentary characters can be

But still the fact remains that Mental Philosophy has been and is taught with profit to many. Its scientific aspect must therefore be a false appearance which it puts on, and its real nature must be after all what the highest Greek experience felt it to be. It must be an ἦθος and not a body of doctrine. In order to discover the nature of this ἦθος, we have to inquire how a man may become better otherwise than by increasing his knowledge of facts, and acquiring technical skill, virtuous habits and good manners. It is obvious that it is possible to be excellent in all these respects without being thoughtful—without reflecting upon one's knowledge or habits. It is the function of philosophical education to encourage this habit of reflection. In a former paper in this journal I attempted to show that in England Locke and his two great successors are chiefly significant for performing this function; and all great philosophers are, I think, significant in this same way. During the Socratic age this function was performed with accessories which cannot now be adequately reproduced. The enthusiasm which made a man aware of his real thoughts and feelings, and the shame of pretended knowledge exposed, were accessories of the dialogue which made it the most effective means of awakening reflection. But before these emotional accompaniments of reflection could be experienced, the young man must have already acquired the reflective or philosophical ἦθος to a considerable extent. We have here to inquire how reflection may be aroused in a mere beginner, in one who is entirely immersed in matter. How shall we suggest to him that the things which his senses present are not exhausted by eye and touch—that it is also possible to think about them? Especially, how shall we suggest the idea that moral distinctions have more than a particular significance? He accepts as ultimate facts that this neighbour is fond of money, and that other vain; that so and so risked his life in

detected. Where Psychology really does good work, as in the hands of such observers as Weber and Fechner, it is not concerned with conscious states viewed in themselves, and in their relations among themselves, but with those only which can be distinctly connected with bodily stimuli. But when M. Straszewski brings forward the undoubtedly scientific discoveries of this Psychophysics as conclusive against my general position, he is unfaithful to the truth from which he himself starts, and which he accuses me of denying, that consciousness is a γένος distinct from the *physique*, &c. My position is that Psychophysics is scientific; but that the *prolegomena* which I have mentioned are not *prolegomena* to it, but are an essentially metaphysical attempt to extend the methods of the good sciences to a ὕλη (not the sensations of Psychophysics, but the higher conscious states as such) which is receptive of *scientific* forms in a sense as illusory, so far as exact science is concerned, as that in which noumena were receptive of the Categories of the Understanding in the scholastic metaphysic discredited by Kant.

attempting to save another's life, and that so and so embezzled trust-money. He is evidently no moralist. But the beginning of Moral Philosophy is to frame for ourselves ideal embodiments of the more striking characters known to us, as we have it done in the fourth book of Aristotle's *Ethics* and in Theophrastus—to dramatise them, to think and feel about them. 'Poetry is more philosophical than History'; philosophical education consists in withdrawing the pupil's mind from the mere particularity of 'history' or 'personal talk,' to 'poetical' objects, creations, works of art. How then is this education to be *begun?* Not, we think, as might at first sight seem proper, by presenting to the pupil moral creations like Aristotle's for his contemplation. He would be sure to treat them not as creations but as particular men described. As Plato felt, poetry is not for the vulgar, who receive its myths or creations for facts. The beginner must first be made aware that it is possible to think about things which are not directly objects of sensation. This can be best done, I think, by means of Formal Logic.

In Formal Logic the beginner is introduced to a system of objects which are not objects of concrete sensation. He begins to *think*. It might of course be possible to make him *think* in other fields, to withdraw his mind from its immersion in sensible particulars to the consideration of their constant relations or laws. But we have seen that youthful thinking is necessarily abstract; to make the beginner think by instructing him in the laws of natural phenomena would accordingly be dangerous—he would think by means of *notiones temere abstractae*. Hence the advantage of first stimulating reflection, or withdrawal from the purely *naïf* objective point of view, by means of the abstractions of Formal Logic which stand by themselves and are less likely than other abstractions to falsify the beginner's view afterwards of any class of objects. That a new epoch is made in the mind of a youth who studies Formal Logic sufficiently far to become interested in its details is matter of common observation. Excelling in the study of *τὰ δι' ἀφαιρέσεως*, he has them here in their safest form. The abstractions of mathematics would not serve our purpose of supplying him with a gymnastic preparatory to real reflection afterwards on the manifold of the natural and moral worlds. Mathematical reflection is too special in its reference. But Formal Logic is a general gymnastic for the philosophical life. It is a means of laying the foundations of the habit of occupying the mind with other objects than those presented to the senses. At the same time it can easily be cast aside when it has performed its gymnastic function. It is a system of abstractions, and as such can be easily apprehended by the young; but it is a system of

abstractions which does not necessarily falsify any realities, and indeed illustrates Grammar with which the pupil is already acquainted. Formal Logic makes a boy reflect upon Language with which he is already familiar; the habit of reflection thus formed will afterwards operate upon experiences which he has not yet felt, although he may know their names. Of course Formal Logic must be taught with great caution, lest it should supply the framework of a Rational Psychology or of a Metaphysic afterwards. It is merely gymnastic, and ought to be cast aside before a constitutive use can be made of its formulæ. Applied Logic, however, is, I think, under all circumstances dangerous for mere beginners in Philosophy. It comes forward expressly to give rules of scientific procedure. But the pupil is ignorant of the sciences, and can only derive injury from learning their methods by heart. He will be sure to take an abstract view of these methods, and to ignore the ὕλη which forms the real difficulty in scientific investigation. The Logic of the Sciences ought to be left till a comparatively late period in the philosophical education. But it generally follows immediately upon Formal Logic. The pupil is introduced to methods which he receives in the same abstract way as he receives the formulæ of Pure Logic. But there is this difference between these formulæ and the scientific methods, that the former are best treated in an abstract way, whereas the latter, by being so treated, lose their value. They are valuable only to one who can clothe them with his own concrete scientific experience. A beginner, if he is to study the Logic of the Sciences at all, ought to read works like Herschel's *Discourse on the Study of Natural Philosophy*, or Darwin's *Origin of Species* or *Coral Reefs*, where the scientific methods are immanent in the concrete experience. Works which exhibit these methods nakedly, valuable as they may be for the more advanced, are unfitted for beginners, because they encourage their natural tendency to take an abstract and premature view of concrete sciences which they have not studied. The system, in short, which teaches the methods of the sciences to those who are ignorant of the facts of the sciences cannot be defended from the educational or any other point of view.

I should trust then to Formal Logic, which ought to be learned at school, to give the beginner's mind the necessary gymnastic preparation for Philosophy. But, although he has practised the gymnastic, he has not yet begun Philosophy. How shall we now proceed? Metaphysics, Psychology, the Logic of the Sciences, and the History of Philosophy, are all out of the question. They all lend themselves to, and exaggerate the natural tendency of the young and inexperienced to abstract or

thin thinking. We must make the pupil, who now has had some practice in the form of reflection, acquainted with one of the great masters of reflection in the reality of his own writings. We must, in short, make him read a *Classic*—critically, and with a view to all its merits, literary and ethical among the rest. One of the lessons, for example, which the young Englishman will learn from the study of Locke's *Essay* will be to admire the man. This is perhaps the nearest thing we now have to the Socratic Dialectic, that living philosophy between friends—master and disciple. But the classic which we put into the hands of our pupil must not be one which reveals itself easily and at once. That would be *ῥητορική*, and not *διαλεκτική*. It must be a book which makes its reader feel that he is being examined by it rather than reading it. To illustrate what I mean—Locke's *Essay* is better for the philosophic novice than Berkeley's *Principles*. Accordingly, not to frustrate this dialectical function of a great classic, the teacher in explaining it ought to avoid giving his pupil, at first, views of the *ensemble*, and to confine himself to the removal of particular difficulties. There are philosophical classics which have been rendered educationally worthless by the essays prefixed to dominant editions of them. With regard to the choice of a classic to begin philosophy with—this is not of nearly so great importance as the avoidance of mediocre writers. Philosophical education may be generally described as the study of the great philosophers, just as education in natural science is the study of nature. Yet there are reasons to determine the choice of a classic. The philosophical *ἦθος* does not supervene by a miracle; it is the development of the pupil's previous education. Hence for those whose school-training has been classical, Aristotle's *Ethics*, is, I think, far the best book, especially if it be connected by means of the *Politics* with the student's previous knowledge of Greek history and life, which, owing to their remoteness and the splendid literary medium through which he has been accustomed to see them, have already acquired an ideal and artistic form in his mind. In the *Politics* and *Ethics* he will find this form elaborated for him by a master's hand; he will be introduced to a world of moral creations, and will experience a curiosity which he never before experienced in connexion with the mere objects of 'personal talk'. He will perhaps feel something akin to that Wonder, which is said to have been the beginning of the Greek Philosophy of Nature, when he thus finds himself in the world of the higher nature with its various moral forms definite after their kinds, and revealing an order and an end of which the natural world is a type with its plants and animals, all after their various kinds, realising definite forms and limits of growth.

There is surely something in this large vision of moral order and purpose to impress one whose eye has hitherto only wandered from neighbour to neighbour, regarding their various characters as all equally natural, and all equally inexplicable in their particular isolation.

If it be asked—What is the use of the philosophical ἦθος thus produced by the study of the great philosophers? I ask in turn—What is the use of Music or Poetry? The question is meaningless. The philosophical ἦθος, like poetical taste, is a form of the higher life. Few men can be creative in the philosophic fine-art; but many can derive profit from the study of philosophic creations. But as these creations are presented in a literary form from which it is impossible to abstract them without distortion, those who would study them with profit must approach them in the literary spirit in which they were conceived by the artist. This is particularly important in the study of Plato, whose Ideas are misunderstood without literary tact; of Aristotle, whose system is much more poetical than it seems; and of Kant, in whose ethics Duty stands to everyday life in much the same figurative relation in which it stands to the stars in Wordsworth's ode. Greek Philosophy cannot be assimilated without Greek Philology; and our great English philosophical classics must be read with a sense of the literary temper produced by the peculiarities of the times in particular writers. These peculiarities being small relatively to the present time as compared with those which moulded the form of Greek literature are less easily detected by us; and hence it happens that Greek Philosophy is easier for beginners than English Philosophy. Many youths have received the true philosophic shock from Aristotle; but Butler's *Sermons*, with all their greatness, are at first only sermons. Considering the previous school and university training of our beginners in philosophy, I think then that it is wise to make philosophical education at first an extension of their Greek reading, and to begin them, as at Oxford, with Aristotle's *Ethics*. In the Scottish Universities the system of separate years and classes encourages the study of Philosophy *per saltum*. A student there seldom, I fear, feels the continuity of his Greek and Moral Philosophy classes. With regard to German Philosophy—it is not for English beginners. Very few of them know German, and therefore cannot study a classic written in that language; and no classic can be translated. The avidity displayed at present by mere beginners in some quarters for the English tincture of certain German philosophies partakes more of the nature of an epidemic than of a genuinely philosophical movement. It is a movement which, contrary to what I consider to be the proper order of philosophical education, brings

the pupil at the very first face to face with abstractions which he is compelled, at his time of life, to receive as real things. He cannot be made to feel, as when he studies Formal Logic, that he is engaged in a mere exercise of gymnastic. He lays the foundations of superstructures which would have astonished the original German philosophers.

Teachers and students of Philosophy fall into all the evils of sectarian narrowness and animosity when they forget, as they too often do, that the philosophical training is after all a *literary* training, and is concerned with moods of mind rather than with objective truth—that it is as much beside the mark to wrangle over the truth of a Philosophy as over the truth of *Paradise Lost*. People of defective culture accuse poets and artists of misrepresenting facts. Poets can only demoralise such people, and ought to be expelled from their Republic. It is criticism which distinguishes moods of mind from objective truths or facts, and which shows, on the one hand, that a mood is often mistaken for a fact, and on the other hand that a mood has its own independent value, and that it is irrelevant to ask concerning some moods whether they answer to facts or not. The former of these two functions of criticism is generally distinguished from the latter as the philosophical from the literary. In Bacon, Descartes, Locke, Berkeley, and Hume we trace the development of philosophical criticism. In Kant we have not only the culmination of previous philosophical criticism, but also an indication of the essential connexion between the philosophical and the literary points of view. He showed that the old scholastic Metaphysic of the Understanding is an illusion, but, by the *rôle* which he assigned to the Ideas of the Reason, indicated the reality of another Metaphysic constituted by the play of the fancy and feelings, and finding its expression in religion, morality and art. The lesson which he thus implicitly conveys is that it is by entering into the fancy and feelings of a philosopher, as these have given themselves literary expression in his writings, that we shall best understand his philosophy and derive philosophical benefit from it.

Thus we are brought round again to our conclusion that Philosophy must be first studied in those authors whose literary spirit is most easily caught by students with a certain previous training. Philosophy is the study, in their full concreteness, of the writings of the great philosophers. There is no Philosophy to be derived by a beginner from the Epitome and the Primer. The study of these belongs to the Pathology of Philosophy, and may be taken up by mature students who have a taste for specialisation.

J. A. STEWART.

II.

A timely question is raised in the foregoing paper, and answered with great directness and vigour. The question is opportunely raised at a time when the Civil Service Commissioners, whose sway gains with every year upon the higher instruction of the country—as new classes of appointments are thrown open to competition—have decreed that Moral Science shall cease to figure by the side of Logic in the scheme of the long-established Indian examination, giving place to Political Economy. This change was invoked with more than prophetic exactness by Mr. A. J. Balfour in the *Fortnightly Review* of August last, before the issue of the revised scheme, and its significance is not the less that a year earlier another public body, the University of London, as noted at the time in these pages (No. IV., p. 577), was moved in whatever spirit to throw away one of the chief distinctions of its examination-system when it ceased to require of all candidates for the degree of Bachelor of Science some knowledge of Logic and Psychology. Now comes Mr. Stewart's argument, conceived from a quite independent point of view, yet so running in part—where he puts forward Logic but makes conditions about Philosophy—that it might be read almost as a justification of the precise action of the Civil Service Commissioners (or Indian Secretary). Such an apparent consensus of opinion is too remarkable not to require some consideration of its grounds. There may also be some use in confronting with the recommendations of an Oxford lecturer those which a different kind of practical experience would suggest to another teacher. And in a journal that was founded mainly on the faith of the existence of a properly scientific doctrine of mind, it seems right not to pass over some observations that Mr. Stewart makes by the way on the character of Psychology.

First, a few words on the opinion expressed by Mr. Balfour in the course of a general argument on the Indian examination. In his judgment, Moral Science—meaning Metaphysics and Ethics—fails to satisfy every one of the conditions of a good examination-subject, while Political Economy satisfies them all. The effort of memory, he says, in mastering the subject, should be small compared with the effort of intelligence; it should be easy to distinguish an answer that shows a merely skilful use of the memory from one that shows an intelligent grasp of the subject; and there should be substantial agreement respecting the body of doctrine in which the examination is held. Waiving the point whether in this last respect Political Economy does at the present day stand in a better position than Moral Science, I should doubt whether his third condition is of as much practical importance for the ends of a selective examination as he

deems it, while as to the other conditions it surely might be contended that they are very exceptionally satisfied by Moral Science. There can be no question of "mastering" this subject by effort of memory, nor will an examiner, if he knows his business, have much difficulty in judging whether a student is merely remembering or understands a philosophical doctrine. The question, however, that I should like to put to Mr. Balfour is whether it is his opinion that Moral Science should not be studied at all by the class of men whence Indian civil servants are drawn. If this is not his meaning, the true way of dealing with the examination should rather be to make it more stringent. What I suppose Mr. Balfour really to mean is that a smattering of philosophical knowledge is not, like some other smatterings, a harmless mental possession; and this may be freely allowed. It is an evil if hitherto men have been tempted to "get up" a little Moral Science, under the impression that it was an easy way of securing marks. Whether the marks were secured or not, the men are likely enough to have suffered mentally and morally by the venture. But the remedy is to take care, by the nature of the examination if not otherwise, that candidates shall have gone through some real and deliberate study. If it be said that this cannot be provided for, but rather the subject must be dropt out of the examination-scheme as not a "good" one (in the sense of Mr. Balfour's conditions or any other), the effect will be to confirm those people in their opinion who think that the public competitive system attains its end at a ruinous sacrifice. The mechanical exigencies of the system, thus applied, might easily prove the death of higher academic culture in the country. It may not be desirable that as many youths should take up with Philosophy as with Mathematics or even Political Economy, but those who follow the philosophic call that comes early to some should not therefore be excluded from the public services.*

Coming now to Mr. Stewart, I find much to agree with in his

* It is only an act of bare justice to acknowledge that the Civil Service Commissioners show the most anxious desire to secure an effective system of examination, and to this intent are never slow to modify their practical regulations in the light of new experience. Nor can it be doubted that the present change in the scheme of examination-subjects—a far more serious matter than a change of working-rules—is meant in the interest of thoroughness. But has it been duly considered in the light of its effect upon the higher instruction of the country? The lowering of the maximum age of candidates for Indian Civil Service appointments, from 21 to 19, makes an important difference in the case of this particular examination; still the change, as affecting one of the recognised branches of academic instruction singly, is ominous all the same, and it will press hardly upon students in those parts of the country where Philosophy is studied most and earliest.

positions. It is a very senseless or even mischievous proceeding to begin the study of Philosophy with a general view of historical systems; nor could the reasons against such a course be more forcibly or accurately expressed than by him. It may also be, and doubtless it often happens, that a beginning is made with Psychology in circumstances such that the step is as inappropriate as he describes it. Neither is any fault to be found with his recommendation to begin with a course of Pure Logic: some teachers do this regularly with great advantage to their students, and even boys and girls at school, as Mr. Stewart rightly urges, may thus be led on, almost insensibly, from their grammatical lessons to a first understanding of the philosophical point of view. As little would one think of contesting his view of the general mental discipline that comes of really intimate converse with any of the master-spirits whose thought is of the cast that withstands all change of time.

Is Philosophy, however, only such an ἦθος as Mr. Stewart would make it? The analogy with Poetry has its foundation. In the depths of your being you feel thus or thus, and if you have the gift of utterance you burst forth in measured strain or lacking spontaneity you revel in this or that poetic creation of others. So of one's philosophy it may be said that it is simply how one tends to think of all things—the general and ultimate expression of one's intellectual personality. You cannot prove a philosophical as you prove a scientific theory: you take it or leave it. Still a philosophical, like a scientific, theory assumes to be a subjective expression of objective fact. One studies the system of a philosopher not expecting to have one's assent extorted as by scientific demonstration, but yet with the aim of being brought to a state of intellectual acquiescence. It is therefore no matter of indifference what systems of philosophy we shall study. The classical student will very naturally turn to the *Republic* or the *Ethics*, and if he really enters into the mind of Plato or Aristotle, will end by being more than a scholar; but if his first object is to obtain philosophical insight —help and inspiration in comprehending himself and the world that he knows by common or (as even a classical student may to some extent know it) by scientific experience—he is more likely to find what he seeks in thinkers nearer to his own time and circumstances. So it is very well that the "young Englishman" should learn to admire the sterling qualities of Locke's nature, intellectual and moral, as they shine forth from the pages of the *Essay;* but he may be helped to see farther into things and have more guidance in ordering his life if he will study those masters who think on a basis of better-ascertained experience, physical and psychological, than Locke did. It is the true Oxford note

that is heard in Mr. Stewart's injunction—"Read a Classic". Classics, whether ancient or modern, are worthy of all regard, and it may be hoped that by this time we are all alive to the duty of assimilating into our consciousness whatever is best in the record of human thought. But the philosophical craving, once it is really awakened in any mind, is not to be satisfied by the æsthetic contemplation of a past thinker's work, be he called Locke or Aristotle. Philosophy is not therefore Literature, because there are theoretic as well as practical grounds for distinguishing it from Science.

Even when he appears to be pleading the cause of true as against sham science, the ways of study at Oxford are still uppermost in Mr. Stewart's mind. It is in the interest of Science, not of Literature, that he deprecates the practice of beginning a philosophical course with the study of Psychology, and is led on to urge his objections against the claim of psychological doctrine to rank as scientific. These will be considered presently in their material import. Viewed in their educational bearing, their force seems wholly to depend on one assumption —that the average Oxford student with his public school training in classics or mathematics represents the case of all youths who are brought into contact with philosophical questions through the portals of Psychology. Put the case that a student, besides being fairly read in ancient or modern literature, is acquainted not only with the principles of mathematical reasoning but also to some extent with the experimental methods of physics and chemistry and even with the procedure of biology—how will he suffer in intellectual character by being set to see the processes of science brought to bear on the facts of subjective consciousness? If he knows nothing of the ways of science except what he can learn from Euclid, he may indeed be exposed to the dangers which Mr. Stewart forcibly depicts, but the fault lies with his previous training rather than with Psychology, which might perhaps, by the very nature of things, be no more strict a discipline than Mr. Stewart would make it without therefore either losing the character of Science or ceasing to be the best introduction to the study of Philosophy. It might be supposed too, from the vehemence of Mr. Stewart's argument, that in this country great numbers of students are every year being set to learn from psychological primers, and that all of them, by reason of an exclusively literary or merely mathematical training, are exactly in the condition to have their minds hopelessly perverted in the process. So far as I know, there exists no psychological primer in the language; the number of students, in England at least, that take in any way to Philosophy, is relatively very small; the number of philosophical

students anywhere in Britain that are introduced to Philosophy through Psychology is not great; and those of them who in such a case use books like Mr. Spencer's *Psychology* and Prof. Bain's larger or smaller treatises are not in general so ignorant of physical science as to be in serious danger of misunderstanding everything in the direction of Mr. Stewart's fears. At least, if they study with a teacher who himself understands, they may easily enough be kept from taking everything in an "abstract" sense—so far, that is to say, as they ought to be: physical science when it experiments, biology when it experiments or compares, neither of them can help "abstracting".

The indictment brought by Mr. Stewart against the scientific standing of Psychology comes altogether to something like this: Psychology is not a science, because it is neither abstract like Mathematics or Political Economy, nor experimental like Physics or Chemistry, nor comparative like Biology; because, that is to say, it deals neither with such a mere aspect of things as number or figure or such a separable phenomenon in social life as wealth, nor with manageable and measureable physical events, nor with organic forms which if they grow and change have an inexhaustible variety of perceptible attributes preserving fixed relations with one another at every stage. And it is all quite true: Mind is no such quality of objective things as even life, to say nothing of physical motion or figure and number. Mind is the name for just that which is most opposed to what we call objective qualities (though these themselves in ultimate philosophical analysis are easily shown to have an expression in terms of mental experience). But what follows? That there can be no such thing as true statements regarding mind as it appears in you and in me and all our kind? That your subjective experience and mine have not common limits and are not developed according to definite laws the same for us both—laws and limits alike ascertainable? That, in short, there is nothing that can be called psychological science; but if we would take heed of our inmost nature it must be in the way of personal fancy guided by the example of some classical philosopher, ancient or modern? So Mr. Stewart seems to think. But not so think all the best philosophic heads of English name for some two centuries back. Not so think in ever increasing force the most active spirits of other countries where the philosophy of subjective fancy has taken its boldest flights. These have laboured and labour with the difficulties of subjective observation which they know to be most real, and with the graver difficulty of verifying or proving universally valid the relations which the introspective observer finds or thinks he finds among the facts of his own conscious experience.

They have gradually, as the objective sciences, especially physiology, have been slowly developed, acquired the habit of giving greater fixity to their subjective expressions by connecting them, wherever possible, with phenomena of the bodily life—a practice as perfectly legitimate from the scientific point of view as anything could be. They have also, in the most recent time, come to see that mind may be studied not only in its direct bodily manifestations but also in its *products*—in manners and customs, social or religious, and in all the variety of objective phenomena that are the special care of the anthropologist and comparative psychologist; which is again a practice the legitimacy of which cannot reasonably be questioned if it results in the least grain of insight. When all is reckoned, the insight acquired is doubtless defective enough, and the most hopeful psychologists who are wise have the fullest sense of what remains to be done before the scientific title of their doctrine will gain general recognition. At present, imperfect as the doctrine is in many ways, its scientific title is denied less on that account and less on account of the real difficulties that must ever beset its procedure, than simply because its subject-matter (as its champions even more than its foes will contend) is disparate from that of any other of the sciences commonly allowed. Unfortunately, also, with this disparateness of psychological facts and with the acknowledged difficulty of verifying general assertions about Mind, there exists for every man the most perfect facility of expression respecting his own inner experience, which may be straightway taken as representative of all. Hence a popular opinion, laid hold of and systematically applied by some metaphysical thinkers, that a special or technical science of Mind is a superfluity. Mr. Stewart is not of that opinion, for he desiderates the science he denies; but the way he would have Philosophy studied seems curiously well calculated for hindering the growth of an effective Psychology.*

* The really serious charge, not overlooked by Mr. Stewart, that may be urged against Psychology as it now stands, touches the vagueness and generality of its statements. Even in the most scientific of modern psychological treatises there appears little disposition (as the Scotch say) "to condescend upon particulars," and it does not very plainly appear in the books what advantage is gained by restricting the search to phenomenal explanation after the approved manner of the positive sciences, instead of having recourse to metaphysical entities like the "faculties" of the older theorists. No doubt, the business of a scientific manual or theoretic treatise is not to deal with special cases, but to embody general results and to enunciate abstract laws. The true sign, however, that laws proper have been established in any subject, is when they lend themselves to the explanation of particular phenomena, and inevitably suggest deductive applications to be verified by actual experience. The true sign that a science has reached (in its measure) the positive stage,

For my part, be the imperfections of present Psychology what they may, I cannot hesitate to maintain that with Psychology and nothing else the beginning of express philosophical study should be made. Whether or not it may be expected that men will agree in philosophical as in scientific matters, I differ from Mr. Stewart in assuming that it is desirable they should; because Philosophy aims at the expression of a certain kind of truth and, though there may be different kinds of truth, there is but one truth of the same kind. Besides, it has always lain in the notion of Philosophy that the insight obtained should be subservient to conduct, and this makes philosophising a serious business in life, not a mere piece of self-indulgence. Assuming, then, that men are to be brought, as far as may be, to agreement in philosophical conclusions, I desire that the beginning of philosophical study should be made upon ground where agreement is most easily attainable, and this is afforded by Psychology. But here a particular conception of Psychology is, no doubt, implied, and this should be well understood. It is implied that Psychology, while it has an altogether peculiar matter in dealing with the subjective life of consciousness, is brought into relation through Biology with the positive sciences that deal with objective fact, and is, in its own measure, amenable to the recognised conditions of scientific procedure. Now this renders necessary, as a preliminary to psychological study, some course of scientific training. Certainly, as Mr. Stewart urges, the student should not be left to learn from the statement of psychologists what Science is (or is not). But I would add, neither should the student be allowed to take up Philosophy or Psychology without something more than what Mr. Stewart seems to think may serve instead of scientific training—some "ordinary experience of the kind of evidence required by practical men of culture for alleged facts and events". That means, I suppose, either that the study should be deferred till men have been about in the world, or that an acquaintance with good literature will afford the necessary experience. The one supposition amounts to an exclusion of philosophical study from the academic course altogether; the other is based on what seems to me the mistaken conception of

is when its cultivators are moved to essay all kinds of special investigations, and recognise clearly the practical bearing of its principles. In proportion as this journal is made the vehicle of publication for researches into the special phases of mental life, will it prove the scientific character of Psychology, and so fulfil the prime object of its institution. Or, again, in proportion as English psychologists trust themselves to give direction to the educators of youth, will it appear whether those "Laws of Association" which they have put forward as determining all natural development of consciousness and more particularly all intellectual synthesis, are truly the ultimate scientific principles they suppose.

Philosophy that pervades Mr. Stewart's paper. The truest friend of philosophical study, at the present day, will, I think, be the most anxious to contend for a preliminary basis of properly scientific culture. If Philosophy may be understood as rational interpretation of the universe in relation to man, it is of the utmost importance that philosophic thinking should work upon that knowledge which is surest—and this is Science. To say this is not to exclude Literature and History from the philosopher's preparation. The true nature of man is not to be learnt apart from the record of human actions in History and the expression of human sentiments and opinions in Literature. But the key to the philosophic interpretation even of Literature and History (their *enjoyment* is another matter) is to be found in the scientific habit of mind, and this can be gained only by a study of the special or positive sciences. While, therefore, I contend for beginning a philosophical course with Psychology in the interest of definiteness and with a view to unanimity, I assume that Psychology—so special or complex if it is viewed (in its place after Biology) as an objective science, so unique and hard to grasp if it is viewed as the science of subjective experience—will not itself be the first scientific doctrine to which the student is introduced. If it be, the very advantage sought for in making it the first stage of a philosophical discipline is rendered impossible. If, on the other hand, it is itself regarded as the natural term of a general scientific training, the dire effects fancied by Mr. Stewart are in no way to be feared, even though it were true that psychological results could be made no more definite than he finds them.

The case for Psychology is in truth extremely plain and simple. In Philosophy we are going to consider what may be said more or less determinately concerning the whole frame of things and man's relation thereto; and we can proceed in either of two ways. We may begin in haphazard fashion, looking at the universe of being from this particular side or that, according to the fancy and temperament of the thinker. Or we may be guided by the thought that well-ascertained knowledge, to which we give the name of Science, has become possible under certain conditions of purely phenomenal consideration, and, as it is clear that our mental life in its various phases must contain an expression for all that is known, felt, or aimed at in relation to the world of being, we may seek to come at our ultimate comprehension of this through the most strictly scientific consideration that may be attainable of the facts and laws of mind as it appears. This psychological science is not in itself Philosophy, but there is no philosophical question whatever that has not its roots in some fact or facts of mental experience, and,

however difficult it may be, men can, if they try, come to something like agreement here, and may then be impelled towards the same philosophical conclusions beyond. This is the great and fruitful idea that has inspired all characteristically British thinking for more than two centuries past, and it has been a truly philosophical conception even in those cases where the thinker has sought to merge everything in mere Psychology, and failed to mark where he crossed the borderline. It has preserved English philosophers from many a pitfall that has received less wary thinkers, and, as it arose in Locke and others from their having regard to the first great achievements of modern science, so in these latter days, when the natural sciences have had, as it were, a new birth, it has gained widely upon men's minds, and become the dominant conception in Philosophy.

If Psychology (with due preparation) is taken first in a philosophical course, Logic will naturally follow next. Should the formal doctrine, as Mr. Stewart suggests, have entered into the school-work, so much will have been gained, but, if not communicated earlier, it can no longer be deferred. The importance of Logic as a preliminary to philosophical thinking is accurately described by Mr. Stewart; or it may be regarded as a constituent part of Philosophy. There is not a more intelligible, or, when fairly understood, a more satisfactory definition of Logic than to view it as the doctrine *regulative* of thinking (or general knowledge) with a view to truth. From this point of view, its relation to Psychology and also its distinctive character are at once clearly seen. For the regulation of thinking it is necessary to understand how thinking naturally proceeds; at the same time, psychological insight does not of itself supply regulation. Regulation is a practical requirement, not a simply theoretic or scientific conception, and as applied to a phase of mental life corresponds with the strict notion of Philosophy. Logic, in relation to Psychology, may therefore be regarded as a department of Philosophy,—and this entirely without prejudice to another view according to which it may be taken as the most general of the abstract sciences, more general (in the sense that it deals with wider and simpler *objective* relations) than Mathematics, as Mathematics is more general than Physics. The conditions of Truth or true knowledge—Science as opposed to Opinion—being the concern of Logic viewed as a philosophical discipline, the discipline must be not less wide than are the varieties of truth. There is truth, as we say, to one's self and truth of fact, or (otherwise expressed) truth of consistency and real or objective truth. Formal Logic determines the condition of self-consistency, and is very properly taken first, because the prime concern

with all of us, born as we are into the social state, is to work out more or less fully the meaning of the general assertions communicated to us that make far the greatest part of all we call our knowledge, and to apply general rules of practical conduct which it was never left to each of us to devise. But it is quite necessary to follow up Formal Logic with that other doctrine of Applied or Material Logic (or however else it is called) to which Mr. Stewart so pointedly refers. The study of such books as Mill's *Logic*, or Prof. Jevons's *Principles of Science*, in their methodological parts, may have little meaning for minds that know nothing of the special sciences; but students who have even a small acquaintance with scientific facts are very profitably led to consider the principles of evidence upon which they are received with a confidence varying in different kinds of matter, since the very same principles are involved in all the *real* inferences drawn in common life. At the same time it may be readily granted that to catch the true scientific spirit it is necessary to follow a master like Mr. Darwin at his work, be it coral-reefs or carnivorous plants that he is for the time investigating with an almost unconscious perfection of method; though the real appreciation of what in him has become art is greatly helped by foregone express study of Methodology. The class of inquiries coming under the head of Theory of Knowledge, it should also be added, falls to be introduced at this stage. The most scientific part of Philosophy proper is naturally associated with the logical determination of the conditions of Science.

On the same level with Logic and in a similar relation to Psychology stands Ethics. The student is not fit to enter upon this department of philosophical discipline without such preliminary training as has here been sketched, but with such training I do not see in what respect—as, for example, want of as much knowledge of the world as he may afterwards acquire—he is now unfit to be introduced to it. Now or at any time, however, he ought, in my opinion, to be introduced to ethical questions, not upon any interest he may happen to feel or be induced to feel in a particular work, whether of Aristotle or another, but definitely in relation to the original start in Psychology. Human action needs to be regulated as well as simply accounted for, and the philosophical theory of its regulation is Ethics, but for this it first needs to be explained in its natural manifestations. In a complete philosophical course, the student would also have presented to him the theory of the regulation of Feeling as far as this has yet been worked out, on a psychological basis, in Æsthetics.

What remains, as it seems to me, is that at this stage and not

before—at all events not before Psychology has been followed up by Logic in its broader interpretation—the study of History of Philosophy should be seriously taken in hand. And I do not hesitate to say, with all the fear of Mr. Stewart upon me, that the study should in the first instance be made quite comprehensive and general, and that only afterwards should come that special occupation with this thinker or the other which with Mr. Stewart is the beginning and end of philosophical discipline. I would add too—what has been already remarked in another connexion—that when it comes to this it is no matter of indifference who the thinker is that should thus be assimilated into the student's mind. As we have to think nowadays in reference to a quite different experience from that of two or three, not to say twenty or more, centuries ago, it behoves the student to begin his *special* study of philosophers with a master not too far removed. The English student, supposing him to have become moderately familiar with the recent work of his own countrymen at the earlier or more positive stages of his philosophical course, cannot procure himself at once so much elevation of view and so much serious discipline in regard to the intellectual needs of the present time as by a thorough study of Kant at first hand. What knowledge of previous speculation is necessary for the understanding of Kant will have been obtained in the course of that general view of the development of philosophical thinking which is here supposed to have gone before.

The reason for studying Philosophy proper in its History is not far to seek. Even Science cannot be intelligently laid hold of without some notion of the way along which the present state of knowledge has been reached. Much more will it be an aid to philosophical insight to mark the past phases of speculation. Though there is no greater error than to suppose that there has been no movement in philosophical thinking or that there has been movement but no progress, it is not to be thought that a serious philosophical doctrine that fully satisfied the human mind at any stage of its development, can be discounted like the first rude representation of fact in early Science, or that it retains a purely antiquarian interest only. As Philosophy, though also a representation of a certain kind of fact, is essentially a representation that keeps terms with human feeling and human aspiration—is, in point of fact, *subjectively* determined—we are to expect in this department of human conceiving a certain recurrence of typical modes of interpretation that can never lose their value for different classes of minds, and thus an amount of guidance from the historical past which is not to be expected elsewhere. Nor, for my part, do I see how Philosophy proper (or Metaphysic in its stricter sense) can profitably be

conveyed to students except in the critico-historical fashion. Even if a teacher, in these critical rather than constructive days, seeks to expound *his* ultimate view of things to a class of students, it is to them but one other added to the tale of historical systems, and the chances, in any particular case, are against the supposition of its being of equal value with the greater philosophical constructions that have weathered the storms of time. As the crown of a philosophical education, students are to be taught to think for themselves; and to this end there seems no other way but that of bringing before them a representation of the thinking of the best minds of the race. On this vital point there is no difference between Mr. Stewart and me. I object only to the arbitrary way in which he seems to shut up the student to converse with this single thinker or that, whereas I would give the student, after due preparation, the free choice of all. And as a last word I repeat *after due preparation*—scientific and other.

EDITOR.

VI.—CRITICAL NOTICES.

Der Operationskreis des Logikkalkuls. Von Dr. ERNST SCHRÖDER, ordentlichem Professor der Mathematik an der Polytechnischen Schule in Karlsruhe. Leipzig: Teubner, 1877.

This tractate, of only 37 pages, contains the clearest and most elegant exposition yet given of the mathematical or algebraic doctrine of logical reasoning. In essentials the author agrees with Boole, and his work may be regarded as in many points a simplification, in some points a rectification, of the elaborate processes first fully stated in the *Laws of Thought*. To Boole's method Schröder objects that the several steps in the symbolical processes are not in themselves interpretable or intelligible, and that certain elements are introduced and employed which cannot but be regarded as altogether foreign to the nature of logical inference. In place of Boole's algebraic method, he would therefore substitute forms capable of symbolic statement and subject to definite symbolic laws, but deduced carefully from the nature of the quantities symbolised, and at each stage intuitively interpretable.

Schröder, like Boole and all who have adopted the quasi-mathematical view of logical processes, starts from the consideration of classes as the elements of reasoning. Classes of things are the only logical quantities and the laws of symbolic operation are immediate

expressions for the various relations of classes to one another. In this mode of restricting attention to the quantitative relations of classes, Schröder agrees in the main with R. Grassmann, to whom he refers, and to whom some of the theorems in the work are due. Grassman's *Begriffslehre oder Logik*, the second part of a more comprehensive treatise on quantitative reasoning in general (*Die Formenlehre oder Mathematik*), deserves attention. He appears to have written in ignorance of any previous attempts at symbolical representation of reasoning, and it can hardly be said that he has worked out his principles to their full extent. Most of the theorems stated in the *Logik* with considerable display of mathematical proof, are merely translations into symbols of the ordinary logical laws of relation between notions in extent. When the same quantitative method is applied to content, the results are not generally of much value. Grassmann expounds no general theorem of elimination which can be made of service in the solution of complicated problems, and though he has handled syllogism, the results are not of the first importance.

Taking as the foundation for his logical calculus the view of symbols as representing classes, the symbolic laws and processes are with Schröder dependent on the nature of class relations. In section first, the specifically logical processes are stated as four in number: two direct—Multiplication or Determination, and Addition or Collection; two indirect or inverse—Division or Abstraction, and Subtraction or Exception. The inverse processes however may be superseded through the operation of a fifth process, Opposition or Negation. In section second, the longest of the four, the principles of the calculus, so far as the direct processes are concerned, are stated with the needful definitions, postulates and axioms. The explanations of symbolic Addition $(a + b)$ and Multiplication (ab), together with the proofs of the cumulative $(ab = ba;\ a + b = b + a)$ and associative $[a(bc) = ab(c);\ a + (b + c) = (a + b) + c]$ laws of these two processes do not essentially differ from those of Boole. On page 12, however, is given a theorem which is not directly used by Boole; the omission, indeed, is one of the peculiarities of Boole's system. It is an evident deduction from the relation of super- and sub-ordinate notions, and may be stated symbolically thus: $a = a + ab$.

The introduction of the negative of any term leads to a statement of the useful principle that of one and the same class-symbol or of equivalent class-symbols the complements are equivalent, complement being that class-symbol which added to any other gives the result 1 or the universe of thinkable things, or which multiplied into the other gives the result 0 or the non-existent. It follows that of each term there is only one negative; thus $a + a_1 = 1$; $aa_1 = 0$.

Theorem 14 (p. 14) is substantially Boole's formula for the development of any logical function, but it receives a somewhat different statement, thus: "Any class b can be expressed in a linear homogeneous manner with regard to any other class a in the form $b = xa + ya_1$," x and y being indeterminate class-symbols which may

have the values 0 or 1. The proof given is elegant; and a useful form of equation, $b = (ab + ua_1)a + (a_1b + va)a_1$, is deduced from it.

Theorem 15 gives a very simple explanation of the rule for multiplying developments according to the same arguments. The result of the multiplication is found by multiplying the coefficients of the similar terms.

Theorems 17 to 20 are the most original in Schröder's work. In 17 it is shown that any logical equation $a = b$ is capable of being resolved into the form

$$ab_1 + a_1b = 0\ ;\ ab + a_1b_1 = 1\ ;\ (a + b_1)(a_1 + b) = 1.$$

By this theorem he is able to dispense with the process of transposition, which can only be employed under definite conditions.

In resolving these equations the negatives of complex terms are constantly involved. Theorems 18 and 19 contain methods for finding these negatives. "The negative of a product is the sum of the negatives of the factors," $(ab)_1 = a_1 + b_1$; "the negative of a sum is the product of the negatives of the members," $(a + b)_1 = a_1b_1$. Similarly the negative of a developed term is found by substituting for *all* the coefficients their negatives; thus $(ab_1 + a_1b)_1 = ab + a_1b_1$; for the first member may be regarded as completely developed with regard to *one* of the quantities, though it is not developed with regard to both.

These propositions lead to the fundamental theorem of Elimination and by simplifying this process they render superfluous much of the algebraic machinery introduced by Boole. Theorem 20 is thus stated: "The equation $xa + ya_1 = 0$ is equivalent to the two equations $xy = 0$ and $a = ux_1 + y$, u being an arbitrary class." Since $u + y = u(y_1 + y) + y = uy_1 + uy + y = uy_1 + y$, and since, if $xy = 0$, $x_1y = y$, the second equation may be written in the forms $a = (u + y)x_1$, or $a = u(y_1 + y)x_1$, or $a = ux_1y_1 + y$.

The inspection of this theorem shows us that by its means we can eliminate any given term from any equation ($xy = 0$ being the result of eliminating a) of the given form, *i.e.*, since by theorem 17 any equation can be thrown into this form, we can eliminate any term from any logical equation. In the same manner we can state any logical quantity in terms of all the others involved in the original equation. The close relation between this method of elimination and that stated by Boole does not require to be pointed out.

The third section of the work applies the method to one of the more complicated examples solved by Boole. The superiority in logical intelligibility of Schröder's solution must be admitted; its superiority in brevity is not so clear.

Section fourth takes up the inverse processes of Subtraction and Division, shows how these are capable of being brought under the same forms of solution as have been expounded for Addition and Multiplication, and points out the peculiar condition, that of disjunctive relation between the terms, necessary for applying them.

As has been said the peculiar merit of Schröder's method is the closeness with which it keeps to the logical realities expressed in

mathematical symbols. It is thus in every sense of the word a *logical* calculus; no law or process is admitted which has not a logical significance, and there is no step taken which is not susceptible of interpretation in logical language. Thus it approaches more closely to Prof. Jevons's method of indirect inference than to Boole's algebraic forms, and it enables us to perceive with more clearness than was possible in the case of Boole's logic, the worth of the symbolic representation of reasoning. Apart from any opinion as to the nature of the judgment, and therefore without pronouncing upon the philosophic validity of the doctrine that all logical quantities are classes, we must admit that after the preliminary process of throwing the premisses into quantitative form has been gone through, the symbolic method allows us to deal easily and compendiously with highly complex and involved reasonings. If we represent notions by symbols and their relations by algebraic signs, and if by introducing contradictory terms we can state exhaustively possible alternatives, then we can avoid the confusion incident to carrying the whole signification of our notions through the train of reasoning. But there is no more generality in the symbolic laws and processes than in the logical laws and processes which they express. We have in no sense brought logic under a more general quantitative science, as at first sight appeared to be the case with Boole's method. Even the process of elimination, which in Boole was effected by devices only dimly recognisable as logical, is in Schröder's system nothing but a complex application of the ordinary formal rules of logical inference. It is a convenient mechanical contrivance, founded on logical forms, and capable of translation into them.

A competent review of these various attempts to simplify logical processes by the use of algebraic symbols is a desideratum in logical literature.

R. Adamson.

De la Conscience en Psychologie et en Morale. Par Francisque Bouillier. Paris: Germer Baillière. 1872.

The word Consciousness, according to M. Bouillier, has many significations, but is to be used as expressing "simple, spontaneous consciousness, embracing all internal phenomena and all mental states"—as the primitive fact of the intellectual and moral life, the condition, the essence even, of every idea and of every feeling. It is not definable; its omnipresence renders circumscription impossible.

The beginnings of consciousness are slow and gradual. The first sensation is a vague impression of easiness or uneasiness, followed immediately by, if not contemporaneous with, the faintest perception of resistance on the part of the bodily organs or of a foreign body. The beginning of consciousness coincides with the beginning of existence; the moment of conception is also the moment of the first consciousness. This is the boldest hypothesis but also the best and

most philosophical. Maine de Biran is right when he says: "To live is to feel".

What is the place of consciousness in a theory of the human mind? Is it, or is it not, a special faculty? If consciousness is a special faculty it ought to be *conceivable* at least apart from any other faculty. But it is not so. No psychological analysis, however subtle, can make it appear that to think and to know that one thinks, to will or to feel and to know that one wills or feels, are not one and the same thing. Leibnitz and Kant, when they speak of "imperceptible perceptions" and "unconscious representations," are not, indeed, speaking with rigorous exactness, but they do not mean to identify themselves with those who hold that consciousness is a special faculty of the mind. They only mean, by these phrases, *facts on the threshold of consciousness*, but not outside it. Others, however, Schelling, Schopenhauer, Herbart, Hartmann, &c., hold that consciousness is an ordinary but not necessary accompaniment of mental operations. But this is not the case. All possible diminutions in the consciousness of such and such an idea or sensation are conceivable, provided these diminutions do not reach the extreme limit of zero—in which case nothing would remain to which the name of sensation or idea could be given without the most singular abuse of reasoning and language. There is no ground whatever for any distinction between consciousness and the phenomena of consciousness.

Again, if consciousness is a special faculty it ought to have its own object, its distinct domain. But there is no such object, and no such domain. All facts, known or felt, are facts of consciousness, but there are no facts which can be called peculiarly its own. Consciousness is not a new element added to other psychological elements to enlighten and complete them, to make them *facts* of consciousness; it is the generative and essential element of all the powers of the soul, of sensation and volition not less than of intelligence itself.

Consciousness is not, then, a special faculty. Far from being shut up, so to speak, in any one part of the soul, it is that which envelops it, that which contains all its phenomena and all its faculties. Far from representing only one class of phenomena and being only one special faculty, all phenomena and all faculties are but its transformations and modifications. Consciousness is not a part of the Ego, it *is* the Ego in its entirety—the stuff of which it is made. It is not only the connecting link, but the very essence, of the powers of the soul—the reality of realities, the fact of facts.

English psychology generally, looking at the soul from the outside, if we may so say, sees nothing but phenomena, relations, laws of association; it finds no *being*, no *faculties*, nothing but apparitions and trains of apparitions. For it is only *within* that the *reason* of these phenomena can be found, and the force which produces and governs them. But an appeal to consciousness itself brings out the fact that we *feel* this force within us, perceive it clearly, in its permanence and identity, through and over all the phenomena which pass and vanish incessantly.

If only phenomena are found in us, so much the more will nothing but phenomena be found in the outer world. If we have not seized a reality in ourselves, a being which *is* ourselves, how can induction lead to the apprehension of any reality whatever outside of us? Mill flatters himself that he has provided for everything, saved everything, by his wonder-working mechanism of the Association of Ideas, "permanent groups," the "permanent possibility" of sensations—as if these possibilities did not demand some permanent *reality* always capable of exciting them in us in the same manner and in the same circumstances. One sees very well how an Ego of simple phenomena can lead to nothing but a Non-Ego of mere appearances. But, looking within, we find that something more than phenomena is given us, something which is the ground of all phenomena; we are conscious, in short, of *being* one, identical, and essentially active—of force, life, thought. This is the direct testimony of consciousness itself; and those who expect to behold the true nature of the soul *outside* of this immediate testimony resemble the man who wished to be at the window to see himself passing in the street below.

But does consciousness reveal to us nothing but our own being? Have we, or have we not, an immediate perception of the external world; or rather, of something which is not us but which exists not less really than ourselves? Has consciousness anything whatever, or has induction, on the contrary, everything, to do with our knowledge of the world without us? The answer is: that which is immediately given us, that which cannot be separated from the feeling of ourselves, is the fact of a *reality which limits and circumscribes our own*; that which is the domain of experience is *the interpretation of the signs, images, sensations, by which this reality successively manifests itself.* At the very dawn of consciousness we have a perception of resistance, we feel the conflict of two forces, the rubbing of what is ourselves against something which is not us, which reduces us to our true dimensions—whatever may be the nature, and whatever the properties otherwise, of this Non-Ego. Such is the element of truth which lies in the Natural Realism of Hamilton, on the one hand, and the Idealism of Mill on the other.

One question only remains: In striking consciousness from the list of intellectual faculties do we efface it from the science of mind? By no means. If consciousness is to be erased from the list of the faculties of the soul it is not because it is nothing; it is, on the contrary, because it is everything. It is consciousness which perceives, wills, remembers, feels, &c.—always the same at bottom, but receiving different names according to the diversity of its operations and modifications. Therefore we are to place it above all the faculties, not as the first among them but as the one principle from which they all emanate—the centre whence they all radiate, or better still, the common essence of which they are only modifications, varying under the influence of the activities within and the impressions from without.

The second part of M. Bouillier's book is an interesting discussion of the moral progress of the race, but is more literary than philo-

sophic, and therefore less demanding exposition here. A word of criticism upon the portion now summarised. The author does well to insist upon regarding consciousness as the true life-stuff, the reality of realities, the one permanent fact in the midst of ever-varying phenomena, *Being* firm and sure—in opposition to all those who talk loosely of "trains of ideas" and "streams of consciousness" without establishing or even postulating any solid ground on which these trains may move, over which these streams may flow. But in his anxiety to establish this unity of existence as constituted by consciousness, it seems to me he has failed to perceive that the primitive act of consciousness which he himself adduces is not really simple but complex. The feeling of easiness or uneasiness, in which he recognises the germ of what afterwards becomes full-grown consciousness, is not a simple feeling: it involves at least a feeling of resistance, which again involves that of force—it also involves a consciousness of effort, which again involves that of will, however rudimentary: all this, at any rate, however much else. The passage of a living being out of absolute unconsciousness into consciousness, M. Bouillier rightly regards as inconceivable; but it is scarcely less so than his own theory of the growth of this highly complex being of ours out of that mathematical point of feeling which he assigns as the root of the whole. And so with that knowledge of the external world which, according to our author, is given by immediate perception: it is much greater than that which he concedes. The consciousness of something which limits and circumscribes me involves also the perception of movement, force, and all the essential qualities of matter. On no basis less solid and broad than this could we have constructed, however gradually, the whole edifice of the outer world as we feel it and see it now. The truth is, the ultimate fact given in and by consciousness is not a simple unity—the unity of a unit, so to speak—but the steady action and re-action of two ever-present realities, an indivisible duality of self and not-self, each under its twofold aspect of subject and object. That this conception is not foreign to M. Bouillier's mind, as it certainly need not be to his philosophy, there are more passages than one in this little book which go to prove. In any case, his work merits the attention of psychologists both on account of the questions it raises and the manner in which they are treated.

ALEXANDER MAIN.

Du Plaisir et de la Douleur. Par FRANCISQUE BOUILLIER. Paris: Hachette, 1877.

Here the author's first care is to mark the equivoques which even yet disturb psychological language, and keep up the confusion of two orders of phenomena so profoundly different as *representative* and *affective* facts. Eliminating every representative element he defines sensibility as *the power of experiencing pleasure and pain.* We cut off, he says, from sensibility all that belongs to the body, all ideas, even the humblest and most confused, and all determinations of the

will, and leave, as its share, only pleasure and pain. These cannot be defined; they are only as we feel them, and all definitions are but repetitions of the words to be defined. There is pleasure whenever the activity of any living being is exercised in accordance with its nature—*i.e.*, in accordance with the preservation and development of its life; there is pain as often as this activity is turned aside from its end and hindered by any obstacle either from within or from without. M. Léon Dumont's theory, that pleasure depends upon an *increase* of vital energy and pain on a *diminution*, goes right in the teeth of experience. Existence itself is only possible on condition that there be *both* increase and diminution. The normal activity, then, unchecked, the evolution of the being according to its law, or this same activity hindered and thwarted, is the one cause, rule, and measure of all pleasures and of all pains. Pleasure is the free play of all the springs of life.

The primary pleasure is the love of life, the primary inclination is the tendency to persevere in being. All pleasures, as well as all pains, whether organic, or moral, or intellectual, spring from the movement of this essential activity towards its end.

There are no purely *passive* pleasures. Whenever we analyse the so-called charms of idleness, of repose, of reverie, we always find that it is not idleness which really pleases, but an activity or occupation *to our mind*, proportioned to our taste and our strength. The idleness which charms is always, strictly speaking, work more or less attractive. Voltaire is right, when he says, "Man is born for action . . . Not to be occupied, and not to exist, are for him the same thing."

There is pleasure even in pain; the chief cause of which lies in the increase, the extraordinary excitation, of activity, in the little shocks which are given to our entire being by the feeling of our own pains or the tragic spectacles which present themselves to our eyes.

In the same way are to be explained the pleasures of *sympathy*, which, at first sight, would seem, because of their character of disinterestedness, to owe their origin to something else than our personal activity and the love of our own being. But the love of our own being comprehends all that reproduces the image of it, all that seems to us as the outside-extension of it. What pleases or pains us in others is precisely what pleases or pains us in ourselves—the different changes, the free or impeded manifestations, the successes or reverses, of a spontaneous activity like our own, in its struggles with that which surrounds, encloses, clogs it. As the root of social morality is individual morality, so the root of sympathetic sensibility is personal sensibility.

Activity, the essence of the soul, is not subject to suspension or intermission: whenever we seek to surprise the soul we always perceive it either acting or re-acting, causing movement and life, or thought and will. There is, therefore, no state of indifference for a conscious being; sensibility is present at every moment of our existence; it is continuous, like the activity from which it emanates. Prof. Bain's doctrine

of *states of neutral excitement* is self-contradictory. There are degrees of sensibility, but there is no absolute extinction of it. It is omnipresent, and continuous without a break. We live and move in the midst of it; our whole being is, so to speak, bathed in it.

But, strictly as pleasure and pain are related to each other, there is nevertheless an order of precedence between them; one of them is the primitive fact, the antecedent, the other is the consequent. The primitive fact is pleasure; pleasure precedes pain, as movement precedes hindrance and arrest. Of the two great modes of sensibility pleasure is the positive, pain the negative.

The *quantity* of pleasure is greater than that of pain; for, if pain is hindrance, arrest, destruction of life, how could it prevail over pleasure without the species ceasing to exist?

There are two possible modes of *classifying* the phenomena of sensibility: the one according to Intrinsic characters, the other according to Extrinsic. The latter is to be preferred. Classification to any purpose can only be made by marking the *causes* of pleasure and pain—the different energies of the soul on which they depend, the different modes of activity which are inseparable from the objects which excite them. There are four principal modes: Instinctive, Habitual, Intellectual, and Voluntary, activity. All other classifications, such as those of Hartley, Bentham, and others, are either too detailed or arbitrary.

Such is a very brief summary of a most interesting and able work. The least satisfactory part of the book is that in which the author offers his classification of the facts of sensibility. If pleasure depends upon the balanced activities of the living being, it follows that the *rank* of the various pleasures is to be determined by the intensity and variety of the forces which the individual is able to keep in free play. It remained for M. Bouillier, therefore, to point out the *objects* which have been found to call forth most readily this intensity of energy, and to set working most freely these various forces. This he has not done, the division he has himself made affording only the faintest suggestion of such a classification, if it does even that much. But he seems to me to have thoroughly secured his central position, that sensibility to pleasure and pain mingles with all our acts and envelops our entire being—is, in fact, one with consciousness itself. There is, however, other ground taken up in the course of his argument which must be regarded as much less tenable. For example, there is a tendency all through to consider sensibility as a real fact, a true something, *quite apart from all its objects*—an ultra-metaphysical tendency, in short, curiously running parallel with a decided bent towards modern views and the concrete treatment of philosophical questions. But surely the humblest fact or act involving conscious activity involves also a knowledge, however limited and dim, of something acted upon. The attempt to look upon the phenomena of pleasure and pain as purely subjective must prove a failure; the merest rudiment of sensibility implies a consciousness not only of a body but also of an external world in contact with it. And even M. Bouillier is forced to admit

as much, practically at least, when he comes to classify the pleasures and pains: finding little help here in purely subjective considerations, he proceeds to arrange his phenomena according to the nature of the *objects* to which they stand related. But why should this be necessary if these phenomena are *bonâ-fide* facts *apart* from *all* objects? Were M. Bouillier to carry out his theory to its legitimate extent, with a full knowledge of all that the simplest act of consciousness includes, he would be led to apply his conception to all the *objective* elements inseparably linked to the most primitive facts of sensibility, and thus to ground the phenomena of pleasure and pain in the very nature of *things*, instead of confining them to the conscious activities of living beings—an extension which would make the theory philosophical in the highest sense, as embracing the facts of *all* existence instead of narrowing itself to a consideration of those only to which it has hitherto pleased most thinkers to attach the conceptions of consciousness and life. He and M. Dumont would then be at one in their last issues, although, in all other respects, the theory of the work before us will be found to cover the facts of experience most completely, and to be most coherent throughout.

ALEXANDER MAIN.

Die Lehre Spinoza's. Von THEODOR CAMERER. Stuttgart: Cotta, 1877. Pp. 300.

THIS is an exposition of Spinoza's thought in its matured and final form, that is, an analysis of the *Ethica* merely, leaving untouched the dark but interesting problem of the origins and growth of the great philosopher's system—a problem to which it is to be hoped the author will now apply himself. And it is an exposition merely, the author avowedly restricting himself to just so much of criticism as is necessary for a thorough characterisation of the doctrines under examination. It is perhaps the most thorough and penetrating analysis of Spinoza's system ever written. Much of the exposition is of course debarred from any claim to newness; but, even when on well-trodden ground, the thorough grasp of his subject and careful statement that the author everywhere maintains would suffice to make his work useful; whilst in not a few instances we find a new light cast upon dark places. The chief novelty is in the treatment of the "*essentiæ*" and the "two divine causalities". Props. 21 to 23 of *Eth.* I. deal with an "infinite divine causality," whose object is "infinite *modi*"; whilst Prop. 28 deals with a "finite divine causality," whose object is "finite *modi*". Camerer shows very instructively that amongst the infinite *modi* we have to place the *essentiæ rerum*, the essences, or *Wesenheiten*, of things. Throughout his exposition of Spinoza's ontology, of his doctrine of cognition, of his theory of the passions, and of his ethics proper, Camerer never loses sight of this principle, that the *essentiæ* of things are infinite *modi*—a method of exposition which seems to articulate the system more closely than it has ever been articulated before; whilst in some cases, as in the treatment of *Eth.* V., 23, it affords standing-ground for a new point of

view. The ground is now quite cut from beneath the feet of those critics, of superior penetration, who would like to make us believe that they have here caught Spinoza in the uncandid act of setting up a merely specious immortality of the soul. The "*aliquid æternum*" that survives the body is the "*essentiæ*" that we meet with on the very threshold of the *Ethica;* it is an inherent and indispensable part of the system. Moreover, not only does this essence of the man survive the destruction of the body: it remains self-conscious too—with a self-consciousness that is personal and individual; (and this for more reasons than one, for which we must refer the reader to pp. 121 to 123 of Camerer's essay). The *Ethica* may, and does, contain obscurities and inconsistencies and faulty reasoning, but from the beginning to the end it certainly does not contain an uncandid word.

As regards criticism, Camerer's exposition gives, of itself, the following chief results:—(1) The Unity of the Attributes in the Substance, and the consequent relations of the products of the different Attributes, are not thinkable in the manner in which Spinoza requires us to think them. (2) The Unity of "the two divine causalities"—infinite and finite—and of their products, is not demonstrated, and the relations of the Infinite and Finite in the world remain a mystery. (3) The relation of the Personal to the Universal, of the individual to the species, remains obscure. Though not possessing the point and brilliancy of style of Kuno Fischer's essay, Camerer's style is clear and precise; his book is a most thorough piece of work, and cannot be too warmly recommended to all who care to understand Spinoza perfectly.

ARTHUR BOLLES LEE.

VII.—REPORTS.

Detection of Colour-Blindness.—A little work by Dr. J. Stilling, *Die Prüfung des Farbensinnes beim Eisenbahn- und Marinepersonal* (Cassel, Fischer, 1877), though published for a purely practical purpose, to test the Colour-Sense of railway servants and pilots, and so avert the danger which arises from mistakes with reference to signals, has still considerable interest for all psychological students whose investigation lead them into the region of analytical inquiry on actual sense-perceptions. It consists of a few pages of letterpress, in German and English (the latter not always very intelligible), accompanying three chromo-lithographic plates, which form the real *raison d'être* of the publication. The plates are extremely ingenious, and admirably adapted for the purpose which they are intended to serve. The first contains four rectangular figures, made up of small chequered squares, in alternate shades of light and dark green; amongst which a few dull red squares are arranged in the form of certain alphabetical letters, printed in exactly equivalent shades, so as to be quite indiscriminable by any difference save that of colour. Had the letters been simply lithographed on a uniform green ground, the overlapping of pigment and the variation of light and shade might have afforded a

clue by which the colour-blind subject could decipher the figures. But the device of definite squares, enclosed by thin black lines, deprives the observer of all such aid, and throws him back upon the pure colour-perception of red and green. The second plate contains similar figures in brown and red; while the third rings the changes upon certain arbitrary symmetrical shapes, so as to supply a device for testing children or adults who cannot read. These tables are useful only for the detection of red-green colour blindness. Another set, sold separately, affords like means for discovering the existence of that rarer abnormality, blue-yellow colour-blindness. It is much to be desired that a few competent psychologists should use these plates for a series of careful observations, noting the results numerically. The currently accepted statistics as to colour-blindness are by no means free from doubt; and many useful experiments might be tried on young children, very illiterate rustics, and inhabitants of various outlying parts of Britain, such as Cornwall, Wales, the Highlands, and Connemara. But this is a work which of course demands co-operation. At the present moment, when so much interest is felt in the question of primitive colour-perception, might not the Anthropological Institute do something to promote or suggest the employment of these or similar tests by travellers amongst low-type savages? We are still sadly ignorant with regard to the actual sense-perceptions of the human race generally, and a little inquiry in this direction on the part of those who have the opportunity, might throw much fresh light on many disputed questions.

G. A.

A contribution to the Theory of Sleep.—Dr. A. Strümpell communicates to *Pflüger's Archiv* XV., p. 573, the following short note:—

"In the autumn of 1876 a lad of sixteen was admitted into the clinical ward at Leipsic, in whom a number of sense-disturbances became gradually developed to an extent that is very rarely observed. The skin over the whole body was in every respect perfectly insensible. The strongest electric currents, or a burning taper held to the skin, could not excite pain or any kind of tactile sensation. A like insensibility was shown by almost all the accessible mucous membranes of the body. The sensations comprised under the name of 'muscular feeling' were also entirely wanting. The patient, when his eyes were shut, could be carried about the room, and his limbs could be placed in the most uncomfortable positions, without his knowing anything about it. Even the feeling of muscular fatigue was lost. There was also complete loss of taste and smell, with amaurosis of the left eye, and deafness of the right ear.

"In short here was an individual *possessing only two channels of communication with the outer world—the right eye and the left ear.* These two last channels could also at any time be easily closed, and thus the *effects of completely isolating the brain from all external sensible stimuli could be observed.*

"I have frequently made the following experiment, and often showed it to others, *always* with the same result. The patient's seeing eye being bandaged and his hearing ear stopped, after a few (generally two or three) minutes the expressions of surprise and the uneasy movements at first excited would die away, his breathing would become quiet and regular, and he would be *fast asleep.* The possibility was thus realised of sending one

artificially to sleep, merely by withholding from the brain all stimulation through the senses.

"The awaking of the patient was as interesting as his going to sleep. He could be roused only by some auditory stimulation, as a shout into his hearing ear, or by letting light fall upon his seeing eye: no pulling or shaking had any effect upon him. When left alone, he would wake 'of himself' in the course of the day—only after a sleep of many hours—either through some 'internal stimulation' or (as the brain gradually became more excitable) through slight external stimuli that could not be kept from acting upon the senses still remaining to him."

Dr. Strümpell promises to give elsewhere a circumstantial account of this most interesting case, and the observations it suggests are better deferred till the fuller information is supplied. The present short note was furnished at the request of Prof. Pflüger, to whose view of sleep (*Archiv* X. 468; see MIND I. 134) it lends support.

Teleological Mechanics of Life.—Professor Pflüger of Bonn has recently published in his *Archiv* (XV. 57) a memoir under the above title, continuing the series of wider speculations for which he has long been distinguished among physiologists. One noteworthy feature of the memoir is the repeated reference which the author makes to the biological doctrines of Aristotle as embodying ideas of permanent scientific value. The paper also contains, among the illustrations or evidence bearing on its main thesis, some suggestions of independent worth on particular questions of physiological psychology.

With regard to the vital processes in general, Pflüger starts from the position that, as a rule, only those combinations of "causes" are realised that are most favourable to the animal's welfare, and he proceeds first to consider the general phenomena of mind and instinct as exhibited by the lower animals and men. Consciousness of some sort, however obscure, must be ascribed to the lower animals when it is seen how in them, as well as in men, action varies with circumstances for the greatest possible benefit of the system. Whether every cell in the body has its beneficial or purposive (and therefore rational) work guided by some faint glimmer—as the work of the ganglion-cells of the central nervous system proceeds in the full light—of consciousness, is a question not to be answered. But at all events there is no need to assume (as Aristotle did) a *psyche* as the immediate cause of the vital phenomena, if all purposive acts of the system can be referred to "an absolute mechanics". Indeed, it will then rather become a question whether "the conscious *psyche*" itself is not a natural phenomenon analogous to the "rational" work of all vital organs. As a matter of fact many processes go on in the central nervous system which, while either unknown to the ego, or at any rate performed without foresight and calculation, have yet as their direct and necessary result conscious perceptions and volitions which the wisest reflection could not make more effective for their ends. Such are the so-called instincts of animals. According to Pflüger, "a rational instinctive act is willed by the conscious ego, but not

motived or induced by foregone conscious reflection," and the selective action which astonishes us so much in the apparent actions of animals would, he thinks, if we had more exact knowledge of the relations of atoms and molecules in the living cell, be found everywhere in the organism. As one remarkable example of instinct observed by himself, he mentions the case of a young turkey hen which, though never fertilised, laid sixteen eggs, and then beginning to brood went on sitting steadily on her nest, or if forcibly removed returned passionately to it for weeks after all the eggs had gradually been taken away. Here the instinctive act of brooding was not only consciously willed, but vehemently maintained, though the proper aim of the act was frustrated from the first, and at last (by removal of the eggs) was no longer present to consciousness. So in like manner, continues Pflüger, in man too there arise thoughts and wishes that result in the most rational and really purposive acts, while yet the true ends are not the motives present to consciousness. Changes of diet with the seasons, changes of occupation, the shrinking (with dizziness) from precipitous places, the aversion to contact with the dead or diseased or to creeping things, the shivering from cold, the craving for light, the curious scanning of new objects and surroundings —are some of the instinctive acts in man occasioned by present feeling, but having for their real ground the self-conservation of the individual. Other instincts subserve the continuance or improvement of the species, such as personal adornment with reference to the sensibilities of the other sex, the sense of shame (found also in lower animals) involving selective choice of partners, dislike of deformed individuals, &c. The new-born child sucks by an instinct, *i.e.*, voluntarily and with pleasure, not as a reflex-machine (which is the common physiological opinion). Maternal love is another instinct; and indeed, from birth to death man (as well as the lower animals) is far more dependent on instincts than is commonly supposed. All of them, as introspection shows, proceed from some internal or external excitation of the senses, with which are joined images and dispositions that determine the will according as they are agreeable or the reverse. When there is no past experience that can be subjectively revived, as in the first flight of the butterfly, we must suppose a motor impulse determined by muscular feeling—a volitional energy of definite quality followed by definite movements, like the impulse to stretch the limbs on awaking from sleep. There is of course no intention in the insect to fly or in the suckling to drink—only a determinate impulse, with a feeling of pain till the ego re-acts in a determinate way. The effects of the particular acts are matter of experience, but the "first voluntary acts" themselves are conditioned by the organisation in such manner as is necessary and advantageous for the animal's well-being.

After the lengthy excursus thus summarised—an excursus which contains many interesting observations, but which is not marked by much precision in the use of psychological terms—Pflüger proceeds to enunciate what he calls the 'Teleological Law of Causation,' implied in these actions of all the obscure forces :—*The cause of every want*

of a living being is also the cause of the satisfaction of the want. By "cause of the want" he means any state supervening in an organism that must for the weal of the individual or species be transformed into another state. Within this supreme principle, he formulates two 'Laws of Teleological Mechanics'. These are :—(1) *When the want affects one particular organ only, this organ alone procures the satisfaction of it ;* (2) *When the same want affects a number of organs at once, a single organ very often procures the satisfaction of it for all.*

In support of the first of these two laws, he refers to the movements of the iris necessary for regulating the amount of light on the retina : these are not determined (as might be expected) by the direct action of light on the cells surrounding the pupil, but are operated through the brain from the optic nerve itself whose interests are concerned, for when the optic nerve is blinded the movements do not occur. Again, the juices secreted by the alimentary canal are poured forth only on occasion, and in proportion to the amount, of the stimulus supplied by substances present in the canal. The bladder and rectum act only when full ; the presence of semen determines the generative act. The living cell itself regulates the flow of oxygen to it ; and expenditure of energy, as by a muscle, not only entails proportionate restoration but also gradual increase of the store. Extirpation of one of two related organs may be compensated by increased activity or even structural development of the other.

The second law is exemplified by the way in which the general want of nutrition in the frame is supplied through particular affection of the vagus nerve or its medullary centre, appearing in consciousness as the feeling of hunger ; also the feeling of thirst, connected with only one nerve that suffers with all the other tissues from want of water, determines a general supply. The movements of respiration are another instance in point, not being determined by continuous periodic action of the respiratory centre in the medulla oblongata, but being accommodated to the extremely variable wants of the bodily system, in respect of the two distinct phases of the respiratory function—the taking-up of oxygen and the giving-off of carbonic acid : want of oxygen in the system excites the nerve-cells of the respiratory centre to increased activity, and excess of carbonic acid has also a stimulative effect, resulting in increased expiration.* But the most striking exemplifica-

* Pflüger here, in order to contest an opposed view of Hermann's as to the respiratory action, makes a long digression which possesses an independent interest. His object is to establish that whatever causes a sudden and considerable increase in the excitability of nervous matter, does also at the same time actually excite it. This, he says, is beyond question, because all living nervous matter is as a matter of fact constantly in a state of excitation. So-called repose of nerve is but a different degree of activity. There is always a faint ringing in the ears which may be heard in stillness if it is attended to. There is always a faint sensibility at any point of the tactile surface to which attention is directed, in the absence of all external stimulus. In the eyes, besides the so-called 'light-chaos' when the eyelids are shut, there is also the state of blackness, which, as Helmholtz maintains, is an actual sensation—being limited to the natural field of vision and not,

tion of the law is seen in the work done by the central nervous system for all other organs or the body generally. "Infinitely varied is its activity in relation to the wants of the individual. The conscious *psyche* itself seeks constantly, often in the most complicated ways, to secure the welfare of the Ego and bring about the most favourable conditions for the satisfaction of its wants." Instinct, as before urged, is in many cases a true guide, the mechanics of this regulation being relatively simple, as based on the principle of pleasure and pain; for, as a rule, all acts conservative of the individual or species are pleasurable, and the contrary ones painful, while the way to self-destruction is barred by the strong impulse of self-preservation even in states of hopeless misery. In man, however, the egoistic impulse, in the complex circumstances of human life, often determines a temporary sacrifice for a greater gain in the future, unlike the lower animals that are impelled always by the needs of the moment, except as they are guided by instinct. There is also the still higher human development attained by some individuals—of self-sacrifice for others: virtue then has cut itself wholly loose from its egoistic root so far as the individual's personality is concerned.

In conclusion, Pflüger seeks to give precision to his view of the animal mechanism by a comparison with the performance of a highly elaborate musical box. The various melodies may represent the various bodily processes in the animal necessary for satisfying incidental wants and meeting occasional disturbances, but the mechanism in the animal is such that the structural or functional change which brings on or constitutes the want touches (as it were) the knob that starts the melody proper for the occasion. However, disturbances may occur which there is nothing in the vital mechanism to meet, or an action may go forward in circumstances where it is unnecessary or even injurious. The work of the organism, in fact, shows a purposiveness that is by no means *absolute*, but present only under certain presuppositions; and this stamps it as of a purely mechanical, and in no respect arbitrary, character. How the teleological mechanics, such as it is, arose is one of the hardest of questions. Empedocles supposed that numberless lumps of varied living matter were at first produced by nature and then perished, till at last some happened to arise that were capable of existing in the circumstances that were. But in strictness no living thing is capable of existence; all perish inevitably sooner or later. Rather we must conceive as a necessary attribute of the *prima materia*, from which all life has proceeded, this—

for example, extended to the back of our bodies. Pflüger's own interpretation of black in relation to white is that they are true opposites (as commonly supposed), depending on different states of excitation in the sense-organ; and in support of this view he forcibly urges the analogy of cold in relation to heat, nobody ever doubting that cold in itself is as much a sensation as heat is. There is indeed, as he says, more than a mere analogy between the two cases; for the eye, according to the development-theory, is to be viewed as a modified piece of the skin, and it is the same physical agent that excites the sensation of temperature in the skin and of light in the eye.

that by virtue of the succession of its changes all in the end leading to death it could produce its like before passing away. The first living matter must have been able to take in nourishment, to grow, to propagate, and to act purposively in relation to its environment. The deepest lying problems of physiology are thus in fact given along with the primordial living matter. In an earlier memoir (X., p. 251 'On physiological Combustion in Living Organisms') Pflüger started an hypothesis as to the processes determining the creation of living things, which, he thinks, opens up at least the possibility of understanding how the greatest of all events in the world could have come to pass in harmony with the law of causation and all known experience.

Sensory Functions of the Spinal Cord.—The foregoing Report should interest all readers who are concerned in the question of Animal Automatism, discussed in the last number of this journal on occasion of Mr. Lewes's *Physical Basis of Mind*. The related question as to the presence of a sensory function proper in the lower nerve-centres, to which Mr. Lewes gives so much prominence, is also touched upon in Pflüger's memoir, and a short summary may here be given of his observations on a point which, in 1853, he was the first among recent physiologists to raise. He has not, he tells us in a note at p. 61 of his present memoir, where he uses the word "Brain" for the whole central nervous system, changed his original opinion as to the sensory functions of the spinal cord. Almost all physiologists are in error as regards the movements of headless or brainless animals. Self-observation alone can show what movements are reflex, *i.e.*, proceed without will, and what do not proceed without will. Every polyp shows an Ego divisible into a number of Egos, as a magnet may be broken up into a number of magnets. If the cerebrum were the only seat of psychical energy, how about the amphioxus that has nothing but a spinal cord? It may also be noted that in some fishes not only the fore brain but also lower portions of the central nervous system have a hemispherical development. If such lower animals are regarded as mere reflex-machines, then also human beings for weeks after birth must be pronounced equally mindless, for the human infant cannot till after some weeks perform even so simple an operation as scratching. The brain, it should be remembered, is developed along with the spinal cord, and consists, as far as we know, of absolutely the same elements. Nobody denies that the central nervous system is the seat of the psychical functions; but the cord is part of it. It has been proved that the nerves of the trunk have their central ends in the cord and not in the brain. Why then is the *psyche* to be supposed immediately connected with the brain and only mediately with these? Many judge the question on purely hypothetical assumptions as to the nature of the psychical process, though this is the greatest of riddles for which nobody has the least shadow of a solution. Some like Du Bois-Reymond would even put forward as scientifically established facts views that are certainly not proved—as if there were an end of controversy on the subject!

In the following number of the *Archiv* (XV. 149), Du Bois-Reymond repels this charge of having made light of Pflüger's objections to the Reflex Theory. In the only printed reference he ever made to the subject *(Leibnizische Gedanken in der neueren Naturwissenschaft*, 1871), his real intention was to represent Pflüger's assumption of sensory functions in the spinal cord as the express alternative to the notion of a pre-established harmony of reflex arrangements, supposed to account for the purposive movements of headless animals. And when he treats the subject in his lectures he is in the habit of closing in some such fashion as this: Either we must suppose the soul divisible, or that in the beginning God provided the frog with a reflex mechanism arranged for the occasion of a physiologist cutting off one of its feet and dropping vinegar upon the other. Du Bois-Reymond thinks he could not more strongly show the disputed condition of the question.

Pflüger accepts the correction, and goes on to elucidate farther his own position, in view of the ironical ascription often made to him of having discovered the "spinal cord soul". It is certain, he says, that particular conscious, *i.e.*, mental *(seelische)* states of varying intensity and quality succeed each other in us, and are only so long observed as the brain-matter is in normal condition and alive, that is to say, is normally nourished and respires. It is certain also that these states stand to the brain as vital process to organs. It is, on the other hand, a hypothesis, to ascribe them to an immaterial soul or spirit. "Soul" can only in strictness be used for the fact of conscious excitation in the central nervous system. Though consciousness has no means of investigating itself, any more than a hand can grasp itself, and thus far remains unexplained, it is not therefore outside the pale of the causal law of nature, without which there can be no scientific inquiry.

The real ground of the opposition to his view lies, Pflüger thinks, in its consequences. It undoubtedly implies that separated parts of the same central nervous system, so long as they remain alive, may be psychically excited apart from each other, or that consciousness is divisible. The fact is evident in the division of lower animals. How is such a result conceivable? "In any psychical nervous mass appearing as a continuous aggregate, the vibrations of all molecules are plainly accommodated to one another. This solidarity of dynamical equilibrium, this harmony of all integrant parts, is the foundation of the individuality and unity of consciousness."

The excitation of psychical matter—matter, that is to say, whose work is joined with consciousness—comes to pass thus. The cerebrum consists of the most unstable sort of living matter, which is constantly being decomposed with great rapidity by heat, while this dissociation takes place more slowly in the spinal cord, though more quickly there than in any other living matter. The brain thus constantly appears spontaneously active and propagating its excitations, which may be received from the sense-organs, to the other parts of the central nervous system, including the spinal cord. And the specific character of this central excitation is to be accompanied by consciousness.

The more the central nervous system is cut away from before backwards, the more torpid and sleepy one of the higher animals will become, and the less complex will be its external psychical acts, though always relatively rational in their character. An amphibian retaining only the spinal cord is sunk in a deep torpor. But every stimulation of the sensory nerves causes an excitation of the cord, which is forthwith, as in the brain, associated with consciousness. The cord is thus momentarily roused from its torpor and, however abnormal the circumstances may be made, reacts according to the principle of pleasure and pain in movements of the limbs that resemble voluntary movements as one egg resembles another. Pflüger therefore regards the movements as reactions of a sensitive being. The reasons that can be given are neither more nor less valid than for the ascription of mind to animals generally. In neither case is there absolute proof.

VIII.—NOTES AND DISCUSSIONS.

Presentative and Representative Cognitions.— Mr. Spencer's division of cognitions (into Presentative, Presentative-Representative, Representative, and Re-representative) when simplified, marks two general classes—Presentative and Representative. The facts that representation is so essential a factor in all our mental processes that practically there is no purely presentative cognition, and that presentative knowledge is found also in the midst of representation have together received illustration in a former paper ('Knowledge and Belief,' MIND No. VII). Yet to the end of showing their mutual relations and their significance in the elaboration of knowledge, it is desirable to note a little further the characteristics of each and the differences between the two.

Knowledge as a product consists of products or results of acts of cognition. What is termed a cognition is a preserved result of an act of cognising. Such a preserved result is only the original cognising act repeated with a difference of feeling which is also cognised (I do not here go outside of consciousness). Accordingly, a mental product elaborated and preserved is a representative cognising act, or, as we say, a representative cognition. It must then be observed that elaborated knowledge—as a product of knowing—consists wholly of representative cognitions, and that presentative knowledge cannot strictly be considered as in any sense a product. Products of knowing are cognitions stored up, so to speak, and the moment the producing becomes a product, it passes from the category of presentative to that of representative knowledge. A product is a *productum*—in a past tense. Indeed even in describing presentative knowledge we are in truth describing representative; for we are dependent upon our recollection for the accuracy of our descriptions, and recollection is the exhibition in the mind of representative cognitions. We are thus led up to the same tangle into which we are always brought when we attempt to solve the problem of memory. Reproduction is a repro-

duction of a past experience, and is hence apparently subordinate to an original present experience; and yet the knowledge that a representation is a representation seems to be equally ultimate and fundamental. But in full view of this difficulty it is nevertheless useful and probably indispensable to make a distinction between presentative and representative knowledge, thus forming two distinguishable though inseparable classes of cognitions. To avoid misconception, however, I repeat that what is termed presentative knowledge is after all an artificial class of representative knowledge, and that the former is not and by its very nature cannot be retained as a product while remaining presentative.

Presentative knowledge, or the presentative element in knowledge, is largely distinguished from the representative by its greater vividness. A thing which we see is more vivid than an idea of that thing. The idea is a copy fainter than the original impression. Sometimes the idea approaches the sensation so closely in the matter of vividness that the two are confounded, as in hallucinations of various sorts embraced under strong emotions; the man under the influence of fear thinks he sees a ghost, the drunkard beholds as realities, horrid, distressing phantoms. But as a rule presentative cognitions may be readily distinguished as such from the higher degree of vividness which the impression has to the mind.

Presentative cognitions are immediate, representative are mediate. We are said to know a thing immediately when we cognise it in itself; mediately, when we cognise it through something numerically different from itself. When one sees a book upon the table, the colour is immediately cognised: on the contrary when the mind has the thought or idea of a book, the book itself being absent, that thought or idea is immediately cognised; but the actual phenomenon of colour is mediately cognised through the idea. Immediate cognition involves the present fact of the existence of a thing; mediate cognition involves the belief in the past, present, or future existence of the thing.

Presentative cognitions are relatively more simple, and representative cognitions are relatively more complex. In the first place representative cognitions have a double character which presentative are without; for every representative cognition is also a presentative one when considered merely as a mental phenomenon. My remembrance of a house is a representative cognition, so far as it refers to the reality of a house known by me; in the degree that it is an idea of the mind it is presentative. In the second place presentative cognition gives no opportunity for the combination and recombination, the differentiation and integration, which is conspicuous in representative knowledge. When through the associating processes knowledge attains as a product great complexity, it is through representative rather than presentative cognition. The higher processes of abstraction, generalisation, comparison, reasoning, and the like, work out their results through representative and re-representative combinations.

In presentative cognitions the continuing present impression is the primary object of cognition; whatever there is of representation (and

the latter is never absent) is secondary and subsidiary to the continuance of the present experience. In looking at a light, my remembrance of the light being present a moment ago is secondary to the present impression of the light and aids in connecting together the moments of continuance. On the other hand, in representative cognition, the primary object of cognition is the past impression; the present idea is secondary to the reality recalled. In remembering John Smith, the actual John as known by me in time past is the primary object of cognition; the present idea of John Smith is only accessory to the recognition of the past experience. So also in believing that something will occur in the future, the occurrence which will be actual is the main object of cognition, while the present idea of that occurrence is but an adjuvant thereto.

It has been already implied that prevailingly presentative cognitions are more original, and prevailingly representative more derivative. The meaning of the terms suggests this. It might then be said perhaps that presentative cognition is the absolutely original factor of knowledge and that representative cognition is wholly derivative. Yet so far as we can discover, no cognition at all is attainable without representation. We are thus forced to a contradiction; but it is only the contradiction to which we are always brought, if we attempt to pass out of the sphere of the relative. It is the same difficulty which arises in attempting to conceive of a beginning. We are all the time positing a beginning of things, but on reflection we are not able to understand how a beginning is possible; *ex nihilo nihil fit.* We say there must have been a point when arose the first item of knowledge; that item was a presentative and original cognition; but in order to any cognition or consciousness at all we find that there must be a representation of former cognition. We can only assert then that the mind makes a fundamental distinction between presentative knowing and representative knowing; that the terms are each necessary to and exclusive of the other; that in the products of knowing, some cognitions are more prevailingly presentative and some more prevailingly representative; that the former are relatively original, the latter relatively derivative.

Presentative cognitions may be either sensational or ideal, presentative cognitions being sensations cognised or ideas; representative cognitions are ideal only. It is probable, however, that this difference is one of degree rather than of kind; a sensation is a mental phenomenon, so also is an idea which is a faint repetition of the sensation. The antithesis, however, is useful in giving a more complete view of the difference between the two classes of cognitions now under review, though it conveys no information not conveyed by the terms presentative and representative.

There are no degrees of intensity in cognition; the intensity is a matter of feeling concomitant with cognition. The terms *vividness* and *faintness*, before made use of, depend for their meaning somewhat, if not entirely, on concurrent feeling, and for the subsistence of the phenomena marked by them feeling must of course be invoked. The

terms *definiteness* and *clearness* (in the sense of definiteness) apply properly to cognition; a cognition may be definitely marked or may be indefinite according as it is sharply separated from some other cognition or blends insensibly with that other. In respect to definiteness and clearness, presentative knowledge is the superior, for representative knowledge carries with it a vast collection of partially integrated, ill-defined cognitions associated together into a mass whose parts are full of confused suggestion not easily bounded or confined. Some representative cognitions, however, of more simple character are definite, as the recollection, for instance, of a familiar face; likewise some presentative cognitions are very indefinite as the cognition of an organic feeling of discomfort; but on the whole the rule prevails as stated.

Inasmuch as knowledge is a growth from relative simplicity to complexity, the most natural division of cognitions is one based upon relative complexity; but since presentative and representative cognition are so inextricably involved with each other in fact, separating the two in classification is no easy matter. In truth, the separation must be somewhat arbitrary, and lines, if drawn at all, must be drawn with only an approximate correctness. Rough groupings may be made, however, of cognitions both presentative and representative according to the degree of their complexity, and such groupings may be serviceable, though liable to frequent revision and change of boundaries.

Presentative cognitions then may be divided according to complexity into five grades or degrees, as follows:—

Presentative Cognitions of the First Degree—those cognitions in which the mind is occupied with localising upon the body a single sensation, as a burn on the hand or a beam of light on the eye. In these cognitions the representative element is at its minimum.

Presentative Cognitions of the Second Degree—those cognitions wherein the mind cognises a plurality of sensations, localising them upon the body, as when one cognises simultaneous pains in two different points of the body, or when one cognises a body by its touch and smell together, having reference still to the localisation of the sensations. In these cognitions the representative element is more prominent, for to cognise two things as co-existent the mind is obliged to represent one of them in contemplating the other, turning from one to the other alternately; this alternate representation is in addition to the continuous representation in the case of each object by which that object as single is kept before the mind.

Presentative Cognitions of the Third Degree—those cognitions in which the mind cognises a single object in its unity as something external to the mind and apart from its sensational effect upon the organism. These cognitions are the ordinary objects of perception taken singly, as a tree, a house, a block of wood, a leaf, and so forth; they are the presentative-representative cognitions of Mr. Spencer, in which the mind is supplying all the time more or less from past experience. In viewing a brick we see only three sides of it perhaps, the other three being concealed from view; these latter we supply

from our representative knowledge. Our perceptions of solidity, distance and direction in given instances are of this degree. The representative element is here quite conspicuous.

Presentative Cognitions of the Fourth Degree—those cognitions whereby the mind cognises a plurality of objects as external to the mind, as when, for instance, I look from my window and see a row of houses, several trees, a church tower, fences, arbours, vines, red and gray clouds. Our presentative cognitions of the external world generally range in this degree.

Presentative Cognitions of the Fifth Degree—ideas of the mind cognised as ideas or mental phenomena. Here presentative cognition and representative cognition seem to meet, the same cognition having both a presentative side and a representative. The connexion of presentative and representative cognition in this manner is not precisely the same as in the case of sensations cognised; there is something superadded. In the latter case the presentative cognition, namely the sensation cognised, is sustained and kept before the mind as a whole by a continuous representation of the preceding presentation, but the representative cognition is not the same with, but different from, the presentative cognition—an idea which goes alongside of the sensation. In the case of an idea not directly connected with a sensation there is a closer union of component parts, so that the *same phenomenon* seems both representative and presentative—presentative as a present mental phenomenon and representative as the medium through which a past phenomenon is recalled. In sensations occur presentative cognition and representative in alternation or running side by side; in ideas we have all that there is in sensations and a mediate cognition besides.

Representative cognitions may be divided in like manner into six grades or degrees, to wit:—

Representative Cognitions of the First Degree—those cognitions which are representations of a single item of presentative cognition considered as a whole, as the recollection of a picture, a face, a feature, a flower, a leaf, a sound, a specific pleasure or pain.

Representative Cognitions of the Second Degree—those cognitions which are representative of a plurality of items of representative cognition considered as wholes; as the recognition of the several parts of a picture or of several pictures, of trees, houses, fences, events, or trains of events which actually have been experienced.

Representative Cognitions of the Third Degree—those cognitions which are combinations of parts and wholes of presentative cognition so as to present recognitions not as wholes, reproductions of any exactly correspondent whole of experience, but in which the constituent parts can still be traced definitely to their sources in experience, as in cognising a particular man with a particular horse's head, or in placing a particular tree we have seen in a valley upon a neighbouring mountain, or in transferring mentally and combining different parts of different landscapes, or making in the mind a different arrangement of the objects in a room.

Representative Cognitions of the Fourth Degree—those cognitions

which are combinations of parts and wholes of presentative and representative cognitions such as form general and abstract notions of which the constituent parts do not represent any assignable whole of experience, and cannot as a rule be traced definitely to their sources. These cognitions are expressed in their various sub-degrees of complexity by general and abstract names—*man, tree, house, dog, truth, virtue, justice.*

Representative Cognitions of the Fifth Degree—those cognitions which are combinations and associations of notions in couples with reference to their agreement and difference; as when on seeing an object it is recognised and classed under the general notion *tree*, or when on cognising a given act it is pronounced virtuous or vicious. This class includes judgments and the products of reasoning.

Representative Cognitions of the Sixth Degree—those cognitions which are a complex of all or most of the preceding classes as in the most elaborate products of imagination. We have a cognition of this grade in the picture of a city whose foundations are precious stones —jasper, sapphire, chalcedony, emerald, &c., whose gates are pearl and whose streets are gold, of which I am a resident, or my brother or wife, and in which all the dwellers are perfectly happy and virtuous, where there is perfect freedom and order, where God reigns and of which He is the light.

These remarks upon the respective characteristics of Presentative and Representative knowledge may thus be summed up :—

(1) Presentative and representative cognition exist together; neither is found by itself alone in experience; that which is called presentative is only relatively presentative; that which is called representative is only relatively representative.

(2) Presentative cognition does not exist as a product, strictly speaking; as soon as it passes into a product at the command of the mind, it becomes representative. Nevertheless, through the power of representation we can retain, recall, and classify it by itself.

(3) Presentative cognitions are relatively vivid; representative, relatively faint. Presentative, as presentative, are immediate; representative as such are mediate. Presentative cognitions are relatively simple, representative are relatively complex. In presentative cognitions the continuing impression is the primary object of cognition, the representative element is secondary; in representative cognition the past impression is the primary object, the present continuing idea is secondary. Presentative cognitions are commonly held as original, representative as derivative; in a qualified and limited sense this is correct. Presentative cognitions may be either sensational or ideal; representative cognitions are ideal only. Presentative knowledge is in general more clear and definite; representative generally more obscure and indefinite.

(4) Presentative and representative cognitions may be grouped in classes, but roughly and without very definite and certain lines of divisions. The most natural classification is according to complexity. By this standard five degrees of relatively increasing complexity may

be made of presentative cognitions and six of representative. These are susceptible of very minute subdivisions.

As far back as the eleventh century the Schoolmen observed a distinction to which, though its consequence was overlooked for a period, philosophy has returned and upon which as fundamental and indispensable the science of knowledge grounds itself—the distinction between the knowledge of a thing present as it is present (*cognitio rei praesentis ut praesens est*) and the knowledge of a thing not as it is present (*cognitio rei non ut praesens est*); a distinction so important that, in the language of Sir William Hamilton, without it "the whole philosophy of knowledge must remain involved in ambiguities".

DANIEL GREENLEAF THOMPSON.

The Philosophy of Ethics.—I desire to explain very concisely two points in my article in the January number of MIND, on which I seem to have been misunderstood.

The first point relates to the distinction between *desiring* an object and regarding it *as an end of action.* My critic in the *Spectator*, January 12th, appears to think that I hold these operations to be the same, and very naturally takes exception to a doctrine which must spread confusion through every part of Ethics. But in doing so he mistakes my meaning. Without asserting that it is possible to desire an object and not at the same time to "posit it" as an end of action (a nice point in psychology, with which I do not meddle), I state confidently that the two acts are altogether different; as will at once become obvious to any one who doubts it, if he will consider that we may desire an object intensely, and yet put it very low down in the scale of ultimate ends, while on the other hand we may put it very high up in that scale—even at the very top—and desire it very faintly, or not desire it at all. This is, of course, the explanation of the fact that we so often know the good and do the evil. Our desire for a lower object overcomes what we call our "better judgment," *i.e.*, our judgment that some incompatible object is preferable to it.

I may point out that no writer can be clear or consistent in his statements on these subjects, except (so to speak) by the help of his reader. The problem is to describe moral or ethical judgment without using the word "ought," a word which of course necessarily begs the whole question. In doing so it is absolutely requisite to use such words as "desire" and "prefer," but these words are ambiguous. "Desire" may mean "wish for"—may be the genus of which "appetite" is one species—and in that sense, in which I use it here, must be most carefully distinguished from "the regarding an object as an end of action". But it may also, without doing any violence to common usage, be used in this latter sense; so that a writer is almost forced by the poverty of technical language to use the same word for two things, which it is absolutely necessary for him to keep altogether distinct in his own mind and in that of his readers.

The second point I wish to touch upon refers to my classification of ethical maxims or propositions into moral and non-moral or im-

moral ones; and I am asked whether it would be proper, in virtue of this classification, to use the word "ought" when speaking of the second or non-moral and immoral group. To put the question in a concrete form—would it be correct, on my theory, to say of a man so filled with resentment that revenge is to him the highest ultimate end, that he *ought* to revenge himself on his enemy?

I reply that the question cannot be answered without some preliminary explanation. For the person who puts the question may mean three things by the word "ought," and may be in search therefore of three different pieces of information. (1) He may want to know whether revenge is in accordance with the recognised moral laws of the community: and the answer to this question (if he happens to be living in England in the nineteenth century) is in the negative. (2) He may want to know whether revenge is consistent with the moral laws which *I*, the person to whom he puts the question, recognise as binding: and in this case, as it happens, the answer is also in the negative. Or (3) he may want to know *whether the proposition prescribing revenge stands in the same ethical relation to the injured man, as the propositions prescribing benevolence (for example) do to the philanthropist to whom the happiness of others is the highest end in itself;* and this question I answer in the affirmative; while I further add that the benevolent man can state no reason for his benevolence which the revengeful man cannot parallel with an exactly similar and equally philosophic reason for his revenge.

ARTHUR JAMES BALFOUR.

Ethics and Psychogony.—The world has no doubt become rather weary of the doctrine of Evolution, and inclined to rebel against its pretensions to revolutionise mental and moral science. When the first shock of a new revelation is over, reaction is sure to follow; and I believe that one of the reasons why Mr. Sidgwick's *Methods of Ethics* was so warmly welcomed, apart from its intrinsic merits, was the relief that men felt at getting back into the old paths of self-introspection and common sense, and their pleasure at seeing Evolutionism boldly sent about its business as a mere intruder whose information was not asked or in any way relevant. No doubt in the Second Edition this has been a good deal altered; the author having, as he tells us in his preface, been led to attach somewhat more importance to the theory of Evolution than formerly: but he still seems to hold that if "men do not *now* normally desire pleasure"—"to say in answer that all men *once* desired pleasure is from an Ethical point of view irrelevant." It would seem therefore that although he now to some extent admits Psychology to Ethics he would still exclude Psychogony from both.

A still stronger expression of the same view is propounded in Mr. Balfour's article in the last number of MIND. Having distinguished between causes which produce and grounds which justify a belief, and assigned the first to Psychology and the second to Philosophy, he says that with regard to ultimate beliefs, of which the differentia is "that there are no grounds for believing them at all," the business of

Philosophy is not to account for or prove them, but simply to disengage them and exhibit them in systematic order. Applying this to the Philosophy of Ethics, and remarking that ethical propositions differ from scientific as not stating facts but duties, he concludes that the ultimate principles of Ethics are *sui generis*, prescribing certain ends as ends-in-themselves, and that "the origin of an ultimate Ethical belief never can affect its validity". The functions of a moralist are therefore not to account for the origin of these ultimate beliefs, or to prove them, or "to justify the judgments which declare which of two final ends is to be preferred," but simply to clear up these ends and judgments and apply them.

Now whether the nature of moral obligation be a problem of Ethics or of Psychology is a mere question of names, (though surely it is hardly questionable that Ethics means more than Casuistry, and includes an inquiry into the 'connotation' as well as the 'denotation' of virtue): but when it is said that "the origin of an ultimate ethical belief can never affect its validity," that is a statement of fact, and a statement which I venture to controvert. I think I can best put my argument in the shape of illustrations.

Suppose a creditor, having after long balancing of accounts arrived at the sum due to him and entered the result in his ledger, came to be cross-examined some years afterwards as to the class of items included in this balance and the principle on which it was made, and that he had then forgotten all about it, even the very fact that he had made it. Suppose now that there was handed to him the paper on which his previous calculations were written, showing all the items which he had added and subtracted, and a total result corresponding to that entered in the ledger; would this paper be or be not useful to 'assist his memory,' and if his recollection had gone beyond recovery, would it or would it not (supposing its genuineness proved) be relevant to the inquiry what was represented by the entry in the ledger? Or suppose a mathematician of authority had worked out an intricate formula and published it, and that this was afterwards found in a certain instance to produce an anomalous result; suppose on this that a friend could find his manuscript calculations showing that the result depended on limitations and conditions which he had omitted to express in it, and which explained the anomaly in the particular instance: would this be irrelevant? If the evidence were excluded, it would be sure to be thought that he had other grounds for his result which were unknown, and which if known might very likely be convincing; and we should thus be reduced simply to a balance of *authority* without the power of verification.

But Mr. Balfour will perhaps object that these are instances of a belief not 'ultimate' but only derivative. I might answer—'That is the very question at issue: till the entry in the ledger and the published formula were explained, they *were* ultimate: they were shown to be derivative only by being derived, and this is just what we propose to do with Ethical formulæ'. But let me take another example. No one can deny that the sensation of hearing is 'ultimate'. Does Mr.

Balfour insist that Acoustics shall deal only with sounds as heard and refuse all information as to vibrations? If so, does he remember that by the theory of vibrations various sensations of hearing have been predicted, as for instance the combination of two sounds to produce silence? Or would he say that a man has not a better knowledge of music if he understands the physical conditions of harmony and timbre, or the mathematical relations of the musical scale? Or take a kindred science to Ethics. There are many maxims or formulæ which may be called 'ultimate principles' of British Politics, and there are 'legal maxims' which may be called 'ultimate principles' of British Law. But would Mr. Balfour say that the meaning or purview of these, or even of an Act of Parliament, which is an 'ultimate principle' *in writing*, can be accurately known without a consideration of the constitutional and legal history of England? If so, how does he account for the prejudice against *doctrinaire* statesmanship, and the shudder which an Englishman feels at any 'theory' of Politics? And if Politics is clearly not bound down to a number of 'ultimate principles,' why should Ethics be so bound?

Speaking generally, I contend that in order to understand the meaning and limits of any proposition it is necessary to know the *grounds* of that proposition; and that if no grounds for it are now apparent, as Mr. Balfour holds to be the case with 'ultimate beliefs,' the only chance is to ascertain if possible what *were* the grounds on which the proposition was first believed—in other words to examine its *origin*. Of course a proposition believed at first on grounds either bad or insufficient to justify it in its full acceptation may afterwards be justified on good and sufficient grounds; but if no new grounds are discovered, it retains only what validity was given it by the old. If these be forgotten, so that the belief comes under the definition of an 'ultimate belief,' and all evidence to refresh the memory is to be rejected as 'irrelevant,' man simply becomes chained down to any illogical belief which his ancestors may have acquired, and the very fact of its being illogical is that which makes him unable to get rid of it, for being a fallacy 'there are no grounds for believing it at all,' hence it is an 'ultimate belief' and no spuriousness of origin can affect its validity. 'We have it *now*,' as Mr. Sidgwick would say, 'what does it matter how we got it?' I on the contrary contend that the existence of a belief is no proof of its truth, unless (and I make the exception only for the sake of argument) it cannot be shown how the belief could have arisen otherwise than on the assumption of its truth. If it can be accounted for as a natural product, but a fallacy, that disposes of any evidence drawn from the fact of its existence.

To apply this to Ethics. Let us grant that there are certain 'ultimate ethical beliefs or propositions' of which the differentia is the word 'ought,' and for which no reason or ground can now be given by Introspection:—let us also grant that the problem of Ethics is not the definition of Virtue, but the enumeration of virtues. Now I allege that by going back to the time when these beliefs first appeared, I can show that the meaning of 'ought' was derived from

certain simpler elements of anticipations of pleasures and pains, and that I can ascertain the grounds on which the propositions in question were first believed and stated: I further say that as no other grounds can now be given for them, these original grounds must be taken to be the only measure of the validity, intent, and extent of the propositions in question: I therefore argue that it is only by reference to these original grounds that the man who has to apply these propositions, namely the *moralist*, can guide himself, and I conclude that knowledge of the origin of moral judgments is of primary importance to Ethics. As one cannot truly understand the character of an individual man without having watched its growth or being told his history, so it is impossible to appreciate the moral nature of mankind, or reconcile its dicta, unless we study it not anatomically only, but physiologically, by retracing the steps of its development. Or to take Mr. Sidgwick's instance: I admit, not indeed in his words that 'men do not *now* normally desire pleasure alone but other things such as virtue', but in what I conceive to be the correct expression of the fact, that men do not *now* normally take pleasure in sensual gratification alone, but in other things also such as virtue. But I say that, if I can prove that the pleasure we now take in virtue originally came from and now represents the pleasure which virtuous action produced, I add a valuable piece of information to the man who is inquiring what is the nature of virtue; for surely, if I show that moral 'good' was made out of pleasures, I thereby disprove the theory that it contains anything else, just as if I show that water is made out of oxygen and hydrogen only, I disprove the theory that it contains carbon. I do not of course argue that in mental chemistry the compound is the exact sum of the components; but only that there is nothing more in the compound than in the components. By habit part of the components may disappear from consciousness, but no new element can be added. The motive to action need not contain all its original constituents, but it must represent them, and can be nothing but pleasure of some kind.

In Mr. Edgeworth's interesting essay on *New and Old Methods of Ethics*, noticed in the last number of MIND, the author suggests an "eirenicon" between Mr. Sidgwick's view and my own, namely that "non-hedonistic preference is ancestral habit". I fear I cannot accept this. For I do not admit that "habit is an exception to or a modification of the general hedonistic rule": so far as there is any preference or motive at all for an habitual action, I hold that preference or motive to be hedonistic; the only difference being that the pleasure habitually produced by the action is associated with the *action itself*, so that the action itself becomes an object of desire apart from its consequences. The same thing I hold to be true with regard to the emotions and affections, for not only do I say with Mr. Edgeworth, that these emotions and affections are "generated by association with" (or rather *of*) "experienced pleasure" and pain; but I add that being thus conglomerations of ideal pleasures and pains, they are themselves pleasurable or painful, and thus, as sources of action, are no exception

to the hedonistic rule. Habit, whether individual or ancestral, operates in my view to transfer on the one hand the pleasurable idea from the end to the means, from the object to the action which secures it; and to fuse together on the other hand, or 'psycho-chemically' combine, a number of elemental feelings into a compound feeling or emotion. Thus as new organs or faculties, physical, mental, or moral, are evolved, their exercise becomes *directly* or in itself pleasurable or painful: and it is by this process and not by any supposed 'non-hedonistic preference' that I would explain the phenomenon of the fixed idea, and the other phenomena which Mr. Edgeworth thinks call for explanation. At the same time I gladly admit that the question is "to be decided by careful observation, not off-hand by definition"; and if my comparison of a thermometer (MIND VI., p. 173) had been put forward as an *à priori* proof that desire or action followed the greatest pleasure, I think Mr. Edgeworth's criticism of it, as open to refutation by a discovery similar to that of water not expanding as its temperature is raised from 32° to 39°, would be decisive. It was suggested not as an inflexible standard, but as "the only practical measure" which we have; and if any man can show a clear instance of 'non-hedonistic preference' I shall be quite ready to correct the measure, and register the exception. But I say that the phenomenon of *ἀκρασία* is not such an exception, because what the measure pretends to register is not pleasures-in-themselves (if I may so speak), that is, considered as all equally distant* and equally certain; but their motive force under particular circumstances, namely those of the actor at the moment of action. Of this latter motive force it seems to me, as I said, that in fact the only practical measure which we have "is

* Mr. Edgeworth says that I suppose motive force "to diminish, like the attraction of bodies, with the distance, in the inverse ratio of the square of the distance in time," and naturally appends a note of admiration. But I specially pointed out that, time having extension in one dimension only, the function involved was probably that of the *simple* inverse; and what I suggested was that the attraction of pleasure might vary not with the inverse distance alone, but according to some law involving some *function* of that quantity *together with other quantities*, one of which I mentioned (MIND VI., p. 174). However on reconsideration I see that the hypothesis, even as so stated, is incorrect; for it expresses a law of equal distribution of force not in *one*, but in *two* dimensions, in which the equidistant points form a circular line, just as the Newtonian law expresses it in space, which is of *three* dimensions, and in which the equidistant points form a spherical surface. For extension in *one* dimension there are *no* equidistant points, the force is theoretically independent of distance; and I come therefore to the conclusion that to a perfect or omniscient mind of infinite duration the motive power of foreseen pleasure would not vary with its distance in time, and that the effect of 'perspective,' which experience points to, is due to our mental imperfection and finiteness, and depends primarily on difference of *probability*, and only mediately (because of the uncertainty of life and the shortness of foresight) on *remoteness* in time. This correction however does not affect my explanation of *ἀκρασία*; whatever be the cause why remote pleasures have less motive power than proximate, there can be no doubt of the fact.

in ourselves the resultant desire, in others the resultant action," and that it is *primâ facie* a good measure is shown by the acknowledged *general* correspondence of desire and idea of pleasure. Until an exception to this correspondence is proved, the measure must be taken to be as good a measure as a pair of scales: should such an exception be proved it may turn out to be no more or even less trustworthy than a water-thermometer.

As I have been led to mention Mr. Edgeworth's essay, I should like to make two remarks on his 'Calculus of Hedonics,' which seems to me both ably conceived and interesting. The first is that the mere statement of the problem 'to divide a certain quantity of material of pleasure among a number of men so as to produce a maximum of pleasure' is sufficient to show that it is a problem of Politics not of Ethics. The State only can apply the problem: the State only is concerned in solving it. My second observation is that to make the problem at all practical, pain-stuff, or labour, as well as pleasure-stuff, must be included in the distribuend,* and if the problem as modified be 'to make such a distribution as to produce a maximum surplus of pleasure over pain,' the conclusion reached is favourable to Egoism. For if I do my sum accurately (as to which I am not sufficiently at home in the Hedonic Calculus to feel very confident), the answer to the problem, supposing the capacity for pleasure and pain to be constant, would be that the labour must be concentrated as much as possible, or at least up to a certain limit, and the means of pleasure applied first in alleviating the pain of labour, and then equally divided; and supposing the capacity to vary, those who have the least capacity should be made to do the work, and the pleasure-stuff after paying a certain amount of wages to the workers, should go to those who have the greatest capacity for pleasure. This then, if the calculation be correct, is the meaning of 'Exact Utilitarianism' when the principle is applied as nearly as may be to actual facts. Now if we assume, as seems (speaking generally) to be the fact, that the higher a being in the scale of evolution, the higher its capacity for pleasure, the result pointed out is just that which is produced by the 'struggle for existence,' or Egoism; but is *not* that which would be produced if moral practice followed ordinary Utilitarian principles: for in that case the best individuals would be those who would most readily do more than their share of work and give up their share of pleasure to the rest, so that the *lower* natures would monopolise the *pleasure-stuff* and the

* Practically the problem is still more complex, for the sum of pleasure-stuff and pain-stuff is itself not constant but must be determined so as to supply a maximum answer to the problem stated in the text. It may be that more labour might be applied so as to produce more pleasure than the pain it cost the labourer. If so, it must be exacted, and so on until the turning-point be reached at which this is no longer the case. Further, it is evident that the higher pleasures, such as those of affection and virtue, can hardly be said to come from pleasure-stuff at all, certainly not to be proportional to it; and similarly with pains: so that the problem as stated is only a small portion of the real problem of producing a total maximum surplus of pleasure.

higher the *pain-stuff*, the most infelicific instead of the most felicific arrangement. The moral I would draw is this: If 'Exact Utilitarianism' be the end of Politics (as is plausible), it is best attained by non-interference with nature to any extent further than to secure fair play in the struggle for existence by eliminating, so far as they do not affect merit, the accidents of wealth, rank and so forth and confining the struggle to merit only, and so to hasten the course of development: if it be the end of Ethics (which I deny), Utilitarian Ethics will best attain its end by practising its own 'preachment' of self-abnegation, and doing all it can to forward that vulgar form of Egoism of which the maxim is success. If it continue to urge men to sacrifice their interests to others otherwise than as the best means to their own success, the best men (who alone will obey) will get less than their proper share, and the total maximum will be spoilt. Thus it would seem that the 'exact' application of the principle of Utility to Ethics is possible only through some method of Egoism.

ALFRED BARRATT.

J. S. Mill's Philosophy tested by Prof. Jevons.—In Prof. Jevons's review of Mill's arguments respecting the ground of our belief in the axioms of Geometry, there occurs a very extraordinary misapprehension. The proposition which Mill seeks to establish (*Logic*, Book II., c. v., §§ 4, 5), is that these axioms are "experimental truths; generalisations from observation. The proposition, Two straight lines cannot enclose a space—or in other words, Two straight lines which have once met, do not meet again, but continue to diverge—is an induction from the evidence of our senses". With his usual clearness, he proceeds to state the objection most likely to be made to this view. His theory being that "we see a property of straight lines to be true by merely fancying ourselves to be looking at them," this probable objection is that, if such be the case, "the ground of our belief cannot be the senses or experience; it must be something mental," for "experience must be *real* looking". This statement of objections is continued thus:—

> "To this argument it might be added in the case of this particular axiom . . . that the evidence of it from actual ocular inspection is not only unnecessary, but unattainable. What says the axiom? That two straight lines *cannot* enclose a space; that after having once intersected, if they are prolonged to infinity they do not meet, but continue to diverge from one another. How can this, in any single case, be proved by actual observation? We may follow the lines to any distance we please; but we cannot follow them to infinity: for aught our senses can testify, they may, immediately beyond the farthest point to which we have traced them, begin to approach and at last meet. Unless, therefore, we had some other proof of the impossibility than observation affords us, we should have no ground for believing the axiom at all."

I must call attention to the fact that the whole of this passage is contained in a single paragraph. The first sentence of the next paragraph runs thus:—

"*To these arguments, which I trust I cannot be accused of understating, a satisfactory answer will, I conceive, be found,* if we advert to one of the characteristic properties of geometrical forms."

Can any one having these two paragraphs before his eyes doubt that the *whole* of the first is a representation of the arguments of a supposed objector? If proof of so palpable a fact be required, is it not sufficiently furnished by the words which I have italicised, which distinctly imply that what has gone before is the objection? This exposition closely followed by criticism is eminently characteristic of Mill.

Now observe Prof. Jevons's reading of this very clear passage which he himself quotes in full at p. 174. He claims to have convicted Mill of gross inconsistency. For was it not said that the axioms are inductions from the evidence of our senses? And are we not now told that we "must have some *further* proof . . . than observation affords us"? Unfortunately, of the two statements quoted in proof of the charge of inconsistency, one is not a statement of Mill's opinion at all. He quotes it as the statement of a supposed opponent, and immediately proceeds to reply to it. Prof. Jevons mistakes the exposition for the reply, supposing the latter to begin with the words, "What says the axiom," etc. Yet surely this is a mistake which a moment's glance at the context, and especially at the words which I have italicised, ought to have prevented.

No doubt, if the "essential illogicality" of Mill's mind can be proved by ascribing to him a statement which he represents as that of an opponent, Prof. Jevons will succeed in his undertaking. It may be some comfort to Mill's disciples to reflect that, on these principles, their revenge is equally easy.

ARTHUR STRACHEY.

Since the publication of my articles on Mill's *Logic* in the *Contemporary Review* of December and of January last, I have been puzzled by the position taken up in regard to them by some of Mill's admirers. They were well aware, they say, of Mill's inconsistencies, and they see no reason why such petty criticisms should be brought against a great logician. "They are perfectly familiar," says my friend and colleague, the Editor of MIND (No. IX., p. 142), "with all the inconsistencies that Prof. Jevons would now laboriously bring to light; and yet they can honour the man, &c." This is perplexing; for if the Editor is familiar with the inconsistencies, these must really exist. But, as logicians, surely we are nothing if we are not logical, and if Mill really has fallen into the inconsistencies which I have pointed out, and shall point out, his work may be a suggestive piece of criticism, it may be a powerful polemic, an instructive review of logical doctrines,—anything else you like to call it, but not "a system" of logic.

The Editor appears to be annoyed that I have occasionally printed the word "system" between inverted commas, and he wants to know whether I mean anything by it. Of course, I mean a great deal—that what is called by Mill a *system*, is as far from being a system as it is

possible to conceive. The Editor says, indeed, "Mill's book is a model of orderly methodical exposition". He must have written this, it is true, before my second article was published, in which I showed that Mill first treats the relation of Resemblance as a minor and exceptional matter of fact; that in the third book he makes it the pivot of his methods of induction; while lastly, in the 24th chapter of his third book, he discovers that it is seldom regarded as a subject of science. Is this orderly methodical exposition? Or is it methodical to make induction rest upon the law of causation, and the law of causation upon induction? Or to make induction consist in inference *from particulars to particulars* in the second book, and then to discover, in the third book (chapters first and second), that the characteristic quality of induction is to obtain a *general* result from particular instances. But these and other specimens of systematic thought will require much analysis.

To turn now to the subject of geometrical reasoning, I deny altogether that the Editor has met even the two cases of inconsistency which he has selected from those I pointed out. I proved by minutely authenticated extracts, that Mill positively denied the existence of real straight lines in nature; he says, nevertheless, that we learn the properties of straight lines by mental experimentation on the images of straight lines in the mind; as we cannot follow straight lines ocularly to any great distance, we follow them in imagination, and try what will happen; these imaginary lines, he says, exactly resemble real ones, a fact which, curiously enough, we learn by observation; it follows unquestionably that, if we discover in these imaginary lines the properties of straight lines, they must be really, that is *perfectly straight;* if so, the real ones, which they *exactly* resemble, must be perfectly straight. There is no possibility of escape from Mill's statements. The Editor, indeed, ingeniously suggests, that "in denying (with whatever reason) that straight lines really exist, Mill never says that we have no perception of lines as apparently straight. So, when he comes to deal with the imaginary lines by which he supposes the geometer able to increase his experience indefinitely, he may very well say that these exactly resemble the lines that are perceptibly (without being really) straight." That is to say, Mill after having made geometrical reasoning the crucial test of his philosophy, having written several laborious chapters on the subject, and having had seven opportunities of revising those chapters in new editions, leaves us still to judge of his doctrine, not by what he has so abundantly said, but by what he has left unsaid. He may have meant, in some of his phases of thought, that lines were *perceptibly straight to us*, when they were not really straight; but, after studying his statements perhaps more closely than any one ever did before, I do not think that the distinction is alluded to by Mill. The Editor gives no reference, and apparently means that Mill might now urge this, if he were alive, because he has not said anything to exclude him from such a position.

This, however, I can hardly admit; because, if the Editor means

that when a line is apparently straight, our mental image of it is not perfectly straight, this image will not serve the purpose of the direct mental experimentation advocated by Mill; but if the image is that of a *perfectly straight line*, then Mill denies its existence, saying, "Since, then, neither in nature, nor in the human mind, do there exist any objects exactly corresponding to the definitions of geometry —&c." (Book II., chap. 5, section 1, beginning of third paragraph.) Nobody ever undertook a more hopeless task than to try and reconcile Mill's statements. His principal doctrine is that we can empirically learn the properties of geometrical figures, although there are no such figures to apply our eyes and minds to.

After thus showing that Mill might have said and meant what he did not say nor apparently mean, the Editor suddenly disclaims any desire to defend Mill:—"However it is no affair of mine to defend Mill's positions. I, for one, cannot think of basing the knowledge of geometrical principles on individual experience, least of all on that kind of passive experience, received by way of the senses, which Mill, without making proper use of the psychology he accepted, generally was content to assume." It seems, then, that the Editor approves neither of the substance of Mill's doctrines, nor of the manner in which he expounded them; he has always been familiar with the inconsistencies which I point out, and moreover there are discrepant assertions which Lange has established. I fail to see then on what grounds the Editor objects so much to my attack. If Mill's doctrine is really wrong and his exposition often self-contradictory, surely the worst I can do is to waste powder and shot—a matter for my own consideration.

Finally, the Editor gives me a few words of advice, and hints that I shall not retain my place, unless after criticising Mill, or rather, I suppose, *while* criticising Mill, I imitate him in reconstructing the damaged edifice of philosophy. The Editor asks (p. 144): "Will he then, for once in a way, tell us quite plainly what he considers are all the elements of a *true* empirical philosophy?" To which I answer, plainly enough—certainly not! Is no man to be a critic, unless he is prepared at once to propose a complete system of philosophy? Is a mathematician not to point out the blunders of a brother mathematician, unless he presents at the same time a mathematical theory of the Universe? Such a demand would render all criticism impossible, and without criticism we should still be speculating about the philosopher's stone, alchemy, realism, and all the absurdities of the scholastic age. In philosophy as well as physical science, truth has continually arisen from the freedom of criticism, and from conflict of opinion.

But I may be allowed to point out that I can hardly be charged with avoiding the labour of constructive writing. In the *Principles of Science*, the second edition of which is noticed and criticised in two separate parts of the same number of MIND,* I have given my view

* The acute objections of Mr. George Bruce Halsted, of the John Hopkins University, to my criticism of Boole's Logic (MIND, No. IX., p. 134) certainly demand a careful answer. While admitting that I may have

of the true forms of reasoning, both deductive and inductive. In typographical extent my book amounts to about two thirds of Mill's System; moreover, it is almost wholly constructive. I purposely avoided Mill's manner of mixing up controversy with exposition, because it is not calculated to lead to clearness of vision. Much of the mystification which overcomes the readers of Mill's works, arises from the fact that Mill is always controversial. He never lays down the bases of a scientific position in a colourless and impartial manner. In almost every paragraph he has a fling at some real or imaginary opponent; indeed the whole "system" is an avowed piece of polemical writing. In the *Autobiography* (pp. 225-227) he candidly explains that the purpose of his book was to overthrow the great intellectual support of false doctrines and bad institutions. Now I respectfully decline to follow Mill's example, or the Editor's advice. In the *Principles of Science* I have done as much constructive logical work as I feel able to do at present, and now I intend to do some destructive work, without mixing together two utterly distinct kinds of composition.

It is true that I have never attempted to assign "all the elements of a *true* empirical philosophy". The Editor, while asking whether I will do it, knows that I shall not accept the challenge, since I have in fact, in the *Principles* (and anew in replying to his critique in the preface to the second edition) disclaimed any attempt to get to the basis of reasoning. Whether in future years I shall do anything more satisfactory to the Editor, depends upon length of life, and upon various circumstances over which no one has control. My own belief is that false philosophy generally arises from premature attempts to solve what is yet far beyond our ken. Thales was a very wise man, no doubt, but he made the mistake of propounding a philosophy of nature. Moisture, he held, was the origin of all things. This grand doctrine seems to me to bear about the same relation to the present bodies of physical science, as the metaphysical doctrines of a Mill, or a Kant, or a Hegel, will bear to the true philosophy of a future age. I decline to meddle with Permanent Possibilities of Sensation, or with such lofty themes as the Knowable and Unknowable, the Absolute, the Unconditioned and the like. Even "all the elements of a true empirical philosophy" are beyond my comprehension. Enough for me if I can firmly plant a few footsteps in the ground already trodden by John Herschel, by Boole, or by De Morgan. But however this may be, I claim the right to expose the mystification and the bad logic of Mill, independently of any efforts at constructive thought.

W. Stanley Jevons.

[Nobody could have a better right than the distinguished author of the *Principles of Science* to reclaim against the observations that I pre-

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formerly interpreted Boole's use of the word Algebra too narrowly, I do not allow the correctness of Mr. Halsted's other objections. The points at issue cannot be dismissed in an off-hand manner, and involve questions of depth and difficulty.

sumed to make on the opening scene of his campaign against Mill, and with his rejoinder the incident might well be regarded as closed, so far as this journal is concerned. I shall hardly, however, be thought to abuse an editor's proverbial privilege if, after he has thus formally dedicated himself to the work of destruction, I add one 'last word' or two.

I see no occasion to recur to his criticism on Mill's view of geometrical science, being content to leave that matter as it stood between him and Mill, and to leave the particular point I formerly noted as it now stands between him and me. (How little careful he was at another point in the original attack is noted by a different hand on a previous page.) Neither will I enter upon his second article: I have seen already in print two pointed exposures of his misreading of Mill's plain meaning as to the relation of Resemblance, and what is the use of a third? But I say (or repeat) of his enterprise generally that it betrays a serious want of perception. Whatever Mill's philosophic sins may be, he does not wield anything like the kind of despotic sway that could alone excuse this violence of attack; and Prof. Jevons ought to know it. Or if he does not know it, and is really convinced that no more pressing work lies to hand to be done, then it cannot be amiss to give him warning that he must not be astonished if he finds his labour disregarded by philosophical workers who, while thankful to have learned from Mill, do not need now to be told that his theory of knowledge was insufficient and landed him in conclusions not always consistent either among themselves or with fact. At the end of his second paper in the *Contemporary Review*, Prof. Jevons says, not without a touch of pathos, that intensely believing as he does that the philosophy of the Mills, both father and son, is a false one, he claims, almost as a right, the attention of those who have sufficiently studied the matters in dispute to judge the arduous work of criticism he has felt it his duty to undertake. I can only remark that I am surprised at this time of day that he should expect it, and I do not think he will get it.

He, on his side, appears to be surprised that those whom he styles "admirers" of Mill should concede the presence of inconsistencies in that thinker, and not see that there is an end of his character as a logician. But suppose one should say that the writer who makes the contradictory statements noted in MIND, No. II., p. 212, or those noted at p. 216, and again (on their repetition in a new edition of his work) in No. IX., p. 148, with many more like them, cannot have done admirable work in logic. The saying would be obviously unjust. Suppose one went still farther and said that such a writer could be no logician. The saying would refute itself by its extravagance. Yet both sayings would be exactly in the manner of Prof. Jevons as regards Mill.

Concerning "destructive work" in Philosophy there is, finally, this remark to make. Prof. Jevons will find it hard to show that the cause of truth has ever been advanced by such purely negative criticism as he is now attempting. The *Nouveaux Essais* of Leibnitz was a very effective piece of negation, but chiefly by reason of the positive doctrine suggested or expressed at every step of the discussion. So with Mill's own *Examination of Hamilton*, as I have before observed. Whether Prof. Jevons is right in what he now says about Mill's manner of writing generally, must be left to the judgment of the impartial reader. It is quite true that Mill had an essentially dialectical mind and emerged into clearness of view through conflict; but it was only for the sake of clearness that he engaged in conflict, and he did emerge. In his way he was a constructive thinker. He had thought out his philosophy. Prof. Jevons fancies that if a man has written with a constructive intention about

logical forms, scientific method and the like, he has purchased the right to do nothing but destroy in the philosophical field. But this is to mistake. No man really constructs in logic who does not lay a philosophical basis; and so far from knowing that Prof. Jevons would decline the challenge to declare himself on fundamental questions, I desire once more in all earnestness to urge upon him that nothing so nearly concerns his reputation. He has gone much too far already in these matters to have it in his power to affect all this modesty of purpose. Or is it seriously meant that he must "decline to meddle with" questions of philosophy? Why then meddle with the philosophy of Mill? The able specialists in whose steps he professes to tread were wiser in their generation.—EDITOR.]

IX.—NEW BOOKS.

Life and Letters of James Hinton. Edited by ELLICE HOPKINS, with an Introduction by Sir W. W. Gull. London: Kegan Paul & Co., 1878. Pp. 371.

The short memoir of James Hinton (by Dr. J. F. Payne) that appeared in MIND II. upon his unexpected death, is proved by this most interesting book to have been as correct in its statement of the main incidents of his life as it was clear and accurate in its indication of his point of view in philosophy. Sir W. Gull, one of Hinton's most intimate friends, gives now another admirable presentation, in short compass, of his characteristic manner of thinking. The Editor's part is throughout performed with great tact and discrimination. The book is a worthy record of a life of consuming intellectual activity directed by a nobility of purpose rarely equalled among men.

A Monograph on Sleep and Dream: their Physiology and Psychology. By EDWARD W. COX. London: Longmans, 1878. Pp. 91.

"Sleep and Dream are familiar physical and psychical conditions, disputed by none and which cannot be ascribed to prepossession, dominant ideas or diluted insanity," says the author, apparently having in his mind some others which can be so ascribed. The conclusion he comes to at the end of his investigation is that "Sleep indicates a *dual* structure—that mind and body are not one;" while Dream seems to prove to him farther that there is an 'I,' which, because it "views and remembers the action of the brain (which is the material organ of the mind), cannot be the brain itself nor the mind itself, but must be something distinct from either, although intimately associated with both." Presently, however, this "I" or "Soul" or "Spirit" appears, in the author's view, to fall together again with "Mind," for we hear of man as being simply "a living soul clothed with a material body". Anyhow, of this soul "the molecular body is but the incrustation, the atoms agglomerated into molecules at the point of contact with the molecularly constructed world in which the present stage of its existence is passed"; while the existence of soul itself "can be proved in precisely the same manner as the existence of electricity and

magnetism and heat". These views "caused considerable discussion" when set forth by the author to "The Psychological Society of Great Britain," of which he is President.

The Evolution of Morality. Being a History of the Development of Moral Culture. By C. STANILAND WAKE. 2 vols. London: Trübner, 1878. Pp. 505, 474.

The object of this work is to show how far the doctrine of Evolution is applicable to the field of morals. It is assumed that certain principles of man's being are brought into active operation in the particular line or direction named "moral," by influences that are chiefly social. The treatment is as far as possible historical; the moral ideas entertained by peoples of different degrees of culture being first set forth, before the endeavour is made to explain their origin. The morality of all primitive peoples was found to have much in common, and as no general and connected description of it existed, it was determined at the risk of interfering with the general aim of the work to supply this deficiency. The aim, however, was to trace the general progress of moral development, and not to explain completely the special phases of it exhibited by different peoples, as, for example, the more cultivated Mohammedan nations among which no new moral feature emerged. The moral teachings of Greek philosophy are not specially considered, because it is doubtful how far they directly influenced the popular morals. Sexual morality is frequently referred to by the way, but the full treatment of "what has become in modern thought almost a separate branch of morals" is left over, as also the related question of the "Fall". In the later chapters an attempt is made not only to explain the religious and moral phases of modern peoples in the light of the experiences of past ages, but also to forecast the future advance of mankind on the path of religious and moral culture. The ground covered by the author may be judged from the following headings of his chapters: 'Modern Theories of Morals'; 'The Sense of Right' (a long account of the morality of the uncultured races, in four chapters); 'Genesis of the Moral Idea' (two chapters); 'The Altruistic Sentiment'; Special development of Altruism'; 'Positive Phases of Morals'; 'Doctrine of Emanations'; 'Hinduism'; 'Buddhism'; 'Mithraism'; 'Christianity'; 'Positivism'; 'Religion and Morality'. A sufficiently conglomerate production, yet withal a valuable collection of facts.

Gotthold Ephraim Lessing: His Life and his Works. By HELEN ZIMMERN. London: Longmans, 1878. Pp. 446.

Miss Zimmern's book, long announced and wholly written before the appearance of Mr. Sime's larger biography noticed in the previous number, is a very straightforward and satisfactory presentation of its subject in general, but does not contain much reference to the philosophical thinking of Lessing. There is a curious remark about Spinoza's *Ethica* on p. 435.

A Dictionary of English Philosophical Terms. By FRANCIS GARD... M.A., Sub-dean of Her Majesty's Chapels Royal, &c. Londo... &c.: Rivingtons, 1878. Pp. 161.

The present little volume will hardly disprove Professor Adamson's assertion in a former number, when reviewing a new edition of the late Dr. Fleming's more pretentious work, that Vocabularies of Philosophy are generally of little value. Nevertheless philosophical readers may find here and there in its pages some new information worth remembering, and they will come across observations that do credit to the author's judgment. His reading cannot be called wide at any stage, and in particular there is little trace of familiarity with recent philosophical literature (after Coleridge and Hamilton), but he gives interesting references to some of the earlier and less-known English writers in philosophy or theology, and as far as he goes he is careful and accurate. It would be easy to point to omissions, as, for example, when speaking of Optimism and declaring that he is "not aware that the question is now frequently raised," he has nothing at all suggested to him about Pessimism; or to quite ineffective statements like this about Monad—"A unit—the term is a technical one in ancient Greek theology and in a different application in the philosophy of Leibnitz." Under Subject, he notes a passage in the *Lectures on Metaphysics*, Vol. I., p. 162, where (without check from his editors) Hamilton seems to betray ignorance of the transposition that has taken place since the Scholastic period in the use of the words 'subject' and 'object'; and the point is sufficiently remarkable. But it might have been added that in the later-written Note B. at the end of Reid's *Works* (p. 806), the exact history of the words is very fully given by the learned thinker.

Phases of Modern Doctrine, in relation to the Intellectual and Active Powers of Nature and Man. By JAMES HAWKINS. London: Longmans, 1878. Pp. 304.

"In the foregoing pages of this little work, we have humbly endeavoured to show that although intellect is an independent growth; civilisation the erratic outcome of issues; religion, like speech, a human invention slowly but perpetually on the change; and that science has itself become almost a visible deity—there are still a great number of mysteries connected with the intellect of Nature which science with all its tests and experiments, and philosophy with all its explorations, know nothing at all about. Neither can science nor philosophy throw the least gleam of light upon that deeply-recessed spirit-life, the soul, considered as human reason, or the true and only motive power of the intellect in man."

Das Leben der Seele, in Monographien über seine Erscheinungen und Gesetze. Von Prof. Dr. M. LAZARUS. Zweite, erweiterte und vermehrte Auflage. Bd. II. Berlin: Dümmler, 1878. Pp. 406.

The first volume of this new and greatly changed edition of the author's well-known work (originally published rather more than

enty years ago) appeared in 1876, as noted at the time in MIND. his second volume was meant to include, besides the three monographs—'Mind and Speech,' 'Tact,' 'Blending and Co-operation of the Arts'—originally composing it, a fourth 'On the Origin of Morality' (presumably, the same as that published separately by the author in 1860 and again in 1867). As it now appears, however, the volume is wholly taken up with the first of the four subjects. The Science of Language has in recent years become so greatly developed, that the author could not within shorter compass attain his object of giving a commensurate expansion to the psychological treatment. In the present monograph, as throughout his whole series, he seeks "not only to elucidate the particular subject in hand but to draw out from it the general laws of mental life," and many doctrines, including that of Heredity, merely foreshadowed twenty years ago, have now to be fully considered. Besides an Introduction and Conclusion, the treatise has five parts: (1) Relation between Mind and Body; (2) Origin of Speech; (3) Acquisition and Development of Speech; (4) Influence of Speech on Thought *(Geist)*; (5) Congruence of Speech and Thought and the question of Mutual Understanding (*Verständniss*). What strikes the author most at the end of his inquiry is the fact that many points of doctrine formerly supposed to be best established, have been reduced, in the progress of investigation, to the state of inchoate opinion. It will be remembered that Steinthal, co-editor with Lazarus of the *Vierteljahrsschrift für Völkerpsychologie u. Sprachwissenschaft*, lately published *his* maturest views on Language in a new edition of his *Ursprung der Sprache* (MIND VI., p. 276).

Die Philosophie in ihrer Geschichte. I., Psychologie. Von Dr. FRIEDRICH HARMS, ord. Prof. an der Univ. zu Berlin. Berlin: Grieben, 1878. Pp. 398.

In opposition to the all-engrossing Empirism of the present day, the author contends for the independence of Philosophy as a distinct form of science with a method of its own conformed to the peculiarity of its subject-matter. He lays particular stress on the necessity of supplementing the natural by the historical sciences for the true appreciation of facts, and holds that there can be no true Philosophy if the notion of experience is limited to our knowledge of nature. In the development of Philosophy itself, historical consideration must go hand in hand with systematic construction; and accordingly the author proceeds in his present volume to consider specially the historical development of Psychology, which, being with him a discipline subordinate to Philosophy, reflects in its changing doctrines the change of philosophical views. How completely the theory of the nature of the soul is determined by the general philosophical conception (physical and metaphysical) appears, according to the author, in the Greeks who had no Psychology but as a department of Physics. Later on, three periods in the history of Philosophy are to be distinguished, headed by Augustine, Descartes, and Kant. With Augustine begins the

psychological and subjective way of cognition. Descartes destroyed the notion of a mere difference of degree between mind and body, and first (?) established their difference in kind. Kant rejected the "psychologism" as well of Leibnitz as of Locke and Hume, which made Psychology either the foundation of Philosophy or a Metaphysic of the Sciences, and worked out Criticism instead as a Transcendental Philosophy. "Within German Philosophy since Kant three forms of Psychology have appeared. One treats it as the doctrine of the faculties and activities of the soul, whereon its life depends. A second seeks to deduce the necessary stages of development in the history and life of the soul from its action and end. The third is Herbart's mechanics of representation. All three are based on general principles and processes of cognition, and arise in the application of these to psychical experience."

Zur Erkenntnisstheorie und Ethik. Drei philosophische Abhandlungen. Von Dr. J. H. Witte, Docenten der Phil. an der Univ. Bonn. Berlin: H. R. Mecklenburg, 1877. Pp. 122.

Three Essays by the author of *Salomon Maimon* (see Prof. Wundt's article in Mind No. VIII., p. 515), in continuation of the line of thought opened out in his *Vorstudien zur Erkenntniss des unerfahrbaren Seins* (1876). He then dealt with (1) the Problem of Philosophy and the value of History of Philosophy, (2) Modern Philosophy before Kant and the Critical point of view. Now his subjects are (1) the beginning of the Critical Philosophy and the Introspective Inquiry into the *Apriori*, (2) the doctrine of Reasoning, (3) Moral Freedom and the Organic view of things (*à propos* of Kant and Trendelenburg).

In Sachen der Psychophysik. Von G. Th. Fechner. Leipzig: Breitkopf u. Härtel, 1877. Pp. 223.

The venerable author contributes to the *Vierteljahrsschrift für wiss. Philosophie*, II., 1, the following statement:—

"The author's *Elemente der Psychophysik*, published in 1860, has in some respects been favourably received and in other respects has met with opposition. So far as he is aware, his principle of the measure of sensation, based on the functional relation between sensation and stimulus, has never yet been directly opposed; also the psychophysical methods of measurement (partly original and partly wrought out after others) which lead to the measure of sensation, have been generally accepted. But all the more strongly have objections been raised against his statement of the *laws* determining the dependence of sensation on stimulus, from which he follows out the measure of sensation; and also against his translation of this dependence into a corresponding dependence of sensation upon psychophysical activity, which involves his view of the quantitative ground-relation between body and mind. These objections, urged chiefly by Helmholtz, Aubert, Mach, Bernstein, Plateau, Brentano, Delbœuf, Hering and Langer, have gradually grown to such a head that the whole psychophysical system of the *Elemente* may seem to be thereby not only shaken but undermined. The opposition of the three last-named inquirers is the most serious, while Bernstein, Delbœuf and Hering have set up altogether new points of view in place of the author's. However, he has not been able to persuade himself of the

validity either of the objections, so far as they touch really fundamental points, or of the new views his opponents would substitute; and this is what he sets out in the present little work, besides giving a critical exposition of the later experimental researches on Weber's law."

Psychologische Analysen auf physiologischer Grundlage. Ein Versuch zur Neubegründung der Seelenlehre. Von ADOLF HORWICZ. Zweiter Theil, zweite Hälfte. 'Die Analyse der qualitativen Gefühle.' Magdeburg: Faber, 1878. Pp. 524.

The first and general part of this important psychological work appeared in 1872, followed by the special analysis of Thought or Intelligence in 1875. The remainder of the work, to include, as then announced, the analysis of the Feelings, Desires and General Moods or Dispositions *(Gesammtzustände)*, was to have appeared shortly afterwards, but the execution of the author's plan has been delayed, and the present volume, notwithstanding its size, includes only the treatment of the Feelings. These, in their qualitative aspect, are divided by the author under four heads: (1) Sense-Feelings, (2) Aesthetic Feelings, (3) Intellectual Feelings, (4) Moral Feelings. The treatment especially of the Moral Feelings (interpreted in the widest sense) is very elaborate. In dealing with the Sense-Feelings the author shows, as in his earlier parts, an intimate acquaintance with the physiological investigations of his countrymen. The whole work is marked by considerable originality, and may at some future time receive the detailed notice which it deserves as a characteristically German attempt to investigate the phenomena of mental life in the spirit of positive science.

X.—NEWS.

Mr. Leslie Stephen sends the following note:—

"Mr. Carveth Read, in the last number of MIND, objects to Prof. Bowen's use of the word 'speculatist'; and it must be admitted that the word has now come to be an Americanism. Like other Americanisms, however, it may be defended by good English authority. It is not in the early editions of Johnson's Dictionary, but it is used by the lexicographer himself. Thus in the *Rambler*, No. 54, he says: 'Though the *speculatist* may see the folly of terrestrial hopes, fears and desires, every hour will give proofs that he never felt it.' Johnson uses the same word elsewhere, as also the less familiar 'controvertist'. It is to be found in other writers of the time, as Tucker, Priestley (I think) and Cowper. The last says in the 'Progress of Error,'

> "'Fresh confidence the speculatist takes
> From every hairbrained proselyte he makes.'"

The John Stuart Mill memorial statue, in bronze by Mr. Woolner, has now been erected on the Thames Embankment, near the Temple. The surplus of the memorial fund, amounting to about £500, will be made over to University College, London, for the foundation of a yearly Scholarship of not less than £20 in Philosophy of Mind and Logic. In making this disposition of the money, rather than giving it for Political Economy, the Committee was partly guided by the

assurance conveyed to it of the opinion held by Mill himself as to the superior educational value of Logic. The Stuart Mill Scholarship will thus be attached to the academic chair that was endowed by Grote on his decease, and that had its scope defined originally by James Mill fifty years ago (in a paper from which some extracts were made in MIND IV., 533).

Ernst Heinrich Weber, author of the famous article 'Tastsinn,' in Wagner's *Handwörterbuch der Physiologie*, upon which has followed so much fruitful investigation in psychophysics by himself and others, died at Leipsic (where he had been professor from 1821) on January 26, at the age of 83.

A Committee (says *Nature*) has been formed at Königsberg to erect a fitting monument on Kant's grave. The city authorities have headed the subscription list with a sum of 4000 marks (£200).

The first number of '*Brain:* A Journal of Neurology,' edited by Drs. Bucknill, Crichton-Browne, Ferrier and Hughlings-Jackson, and published by Messrs. Macmillan & Co., is announced to appear on April 1st. The Journal will be continued quarterly, and will include in its scope all that relates to the anatomy, physiology, pathology and therapeutics of the Nervous System. "The functions and diseases of the nervous system will be discussed both in their physiological and psychological aspects; but mental phenomena will be treated only in correlation with their anatomical substrata, and mental disease will be investigated as far as possible by the methods applicable to nervous diseases in general."

Hume's *Treatise of Human Nature* (Part I., 'Of the Understanding') is now for the first time translated into French, by MM. Renouvier and Pillon, in a handy volume, published at the Bureau of their weekly journal *La Critique Philosophique*. The volume includes also a revised translation (Mérian) of the *Inquiry concerning Human Understanding*, and a general Introduction from the pen of M. Pillon. This translation is a new evidence of the extraordinary philosophical activity displayed by M. Renouvier and his fellow-worker; and they now promise to supplement their weekly discussion of philosophical and political subjects by a quarterly issue, to begin in May, of six or seven sheets bearing specially on the field of religious criticism.

JOURNAL OF SPECULATIVE PHILOSOPHY.—Vol. XI. No. 4. Hegel—'Symbolic Art' (transl.). Kant—'Anthropology' (transl.). Schelling—'The Method of University Study' (transl.). J. Hutchison Stirling—'I am that I am' (poem). Goeschel—'The Immortality of the Soul' (transl.) . . . V. Hartmann—'Darwinism' (transl.). Rosenkranz—'Hegel and his Contemporaries' (transl.). Notes and Discussions. Book Notices.

REVUE PHILOSOPHIQUE.—3me Année, No. I. Herbert Spencer—'Études de Sociologie' (I.). Dr. Ch. Richet—'Sur la méthode de la Psychologie physiologique'. J. Delboeuf—'La loi psychophysique et le nouveau livre de Fechner' (I.). A. Gérard—'Les tendances critiques en Allemagne: Helmholtz et du Bois-Reymond'. Analyses et Comptes-rendus (Grant

Allen, *Physiological Æsthetics, &c.).* Rev. des Périodiques. No. II. H. Spencer—'Etudes de Sociologie' (II.). J. Delboeuf—'La loi psychophysique et le nouveau livre de Fechner' (fin). P. Regnaud—'Philosophie Indienne : Les dogmes de l' École Védanta'. Variétés—'Un théologien philosophique : D. F. Strauss'. Analyses et Comptes-rendus. Correspondance—'La Psychologie physiologique' (Egger, Richet). No. III. P. Mantegazza—'Essai sur la transformation des forces psychiques'. L. Carrau—'Moralistes Anglais contemporains : M. H. Sidgwick' (I.). H. Spencer—'Études de Sociologie' (III.). Notes et Discussions—'Les Mathématiques et la Psychologie' (P. Janet). Analyses et Comptes-rendus. Revue des Périodiques.

La Critique Philosophique.—VIme Année, Nos. 48-52 ; VIIme Année, Nos. 1-6. F. Pillon—'Quel est le veritable père de la psychologie associationiste ?' (48) ; La fin de l' ordre moral' (49) ; 'Importance de la morale' (1) ; 'Claude Bernard' (4) ; 'La biologie selon A. Comte et selon Cl. Bernard (5). C. Renouvier—'Les labyrinthes de la métaphysique : L'infini et le continu—Une évolution personelle' (50) ; 'La question de la peine de mort traitée scientifiquement' (51, 52) ; 'Examen des *Principes de Psychologie* de Spencer : La connaissance du monde externe' (2), 'Idéalisme et Réalisme—Le principe de l' Inconcevable' (3), 'Le Réalisme transfiguré' (6) ; 'La question de la certitude' (4, 6). W. James (Cambridge, Mass.)—'Quelques considerations sur la méthode subjective'.

Zeitschrift für Philosophie, &c.—Bd. LXXII., Heft 1. G. F. Rettig—'Ueber *airia* im *Philebus*'. Th. v. Varnbüler—'Exacte Begründung der absoluten Philosophie' (III.). E. Dreher—'Zum Verständniss der Sinneswahrnehmungen (II.). F. v. Bärenbach—'Das *Ding an sich* als kritischer Grenzbegriff'. R. Schellwien—'Zur Genesis u. Kritik der Erkenntnisslehre. H. Ulrici—'In Sachen der wissenschaftlichen Philosophie'. Recensionen. Bibliographie.

Philosophische Monatshefte.—Bd. XIII. Heft 9. H. Jacobi—'Die Gottesidee in der indischen Philosophie'. Recensionen u. Anzeigen (v. Hertling, *Uber die Grenze der mechanischen Welterklärung ;* Schmidt, *Leibniz u. Baumgarten ;* Kischner, *Leibniz' Psychologie u. G. W. Leibniz ;* Noack, *Philosophie-geschichtliches Lexikon, &c.*). Bibliographie. Phil. Vorlesungen an den deutschen Hochschulen im Wintersemester 1877-8. Heft 10. K. Böhm—'Zur Theorie des Gedächtnisses u. der Erinnerung.' O. Liebmann—'In Sachen der Psychophysik'. Zur Spinoza-Literatur : Zehn Schriften von u. über S., angezeigt von C. Schaarschmidt. Bibliographie, &c. Bd. XIV. Hefte 1, 2. C. Schaarschmidt—'Vom rechten u. vom falschen Kriticismus'. C. Stumpf—'Aus der vierten Dimension'. R. Eucken—'Untersuchungen zur Gesch. der ältern deutschen Philosophie, (I.) Johann Kepler'. Recensionen u. Anzeigen (Grote, *Moral Ideals ;* Caspari, *Grundprobleme der Erkenntnissthätigkeit ;* Knauer, *Der Himmel des Glaubens* ; Spencer, *Principien der Biologie ;* Rosenkranz, *Neue Studien*, Bd. III., &c.). Bibliographie, &c.

Vierteljahrschrift für wissenschaftliche Philosophie.—Bd. II. Heft 2. W. Wundt—'Ueber den gegenwärtigen Zustand der Thierpsychologie'. H. Siebeck—'Die metaphysischen Systeme in ihrem gemeinsamen Verhältnisse zur Erfahrung' (II. Schl.). H. Vaihinger—'Der Begriff des Absoluten (mit Rücksicht auf H. Spencer)'. H. Weissenborn—'Ueber die neuern Ansichten vom Raum und von den geometrischen Axiomen' (I.). Recensionen. Selbstanzeigen.

Erratum in No. IX. P. 36 l. 36—*for* implicitly *read* explicitly.